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'Knowledge is proud that he has learned so much,
Wisdom is humble that he knows no more.'—COWPER.

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ELEMENTARY LESSONS IN AGRICULTURE.

BY PROF. GREEN,
Examiner in Botany to the University of Cambridge.

XIII.—THE DISEASES OF CROPS.

THROUGHOUT the whole series of articles on agricultural science and practice we have laid a good deal of stress on the fact that the plant is a living being, occupied just as really as an animal in the struggle for existence. We have seen that successful agricultural practice depends upon the closest approximation to absolute agreement between the plant and the conditions under which it lives. The more favourable these are the better the result upon the plant; the individual is stronger and better developed, and the offspring healthier and more numerous. If on the other hand the relation between the plant and its environment is less satisfactory, the plant suffers to a corresponding degree. The suffering may be only seen in a less thriving condition of the individual, or it may go further, and want of health, or disease may make its appearance. The disease may be only a condition of malnutrition, the plant may not be able to absorb its food properly, or may be unable to utilise it after absorption. Or more serious results may follow; the feeble condition of health induced as described may be followed or attended by the attack of some lower form of vegetable life, known as blight, mildew, mould, etc. Even healthy plants may be attacked by these insidious pests, though generally there is much greater likelihood of the sufferer being, as it were, out of sorts before the pest affected it.

We have, then, two great classes of disorders to which plants are liable: those due to improper conditions of life, or imperfect cultivation, and those due to the attacks of various forms of fungi. Of the first of these this paper will say but little, as they have been incidentally alluded to in preceding articles. The various forms of disease which result from the attacks of other organisms are very varied, and though far too numerous for full description in this series of articles, a general sketch of their peculiarities must be undertaken.

Looking first at the cereal crops as the most important, we find them infested with several forms of parasitic plants which feed upon their juices and exhaust their vitality, leading to the death of the individual often before it has succeeded in bearing any offspring. When the attack is not so deadly, it has a very bad effect upon the seed, making it much less in amount and poorer in quality. The parasite which does the mischief is in every case one of the plants we have before alluded to as fungi, which have the peculiarity that their cells never contain chlorophyll, so that they cannot feed on the carbon dioxide of the air, but must absorb food material in a fairly elaborated condition from another organism, either living or dead.

The first of these fungi we will examine is the common mildew, which is such a pest to the wheat crop. If we walk through a wheat field in late spring or early summer, we shall find on many of the plants, affecting the blades of the leaves as well as the stouter straw, sundry reddish yellow patches, of varying shape and size. Some of them will probably show the outer skin of the patch ruptured, and a little yellowish powder comes away when the spot is touched. This is the first stage of mildew and is often known by the name of *rust*. If we take an affected leaf, and examine it under a fairly high power of the microscope, we shall find that the cells of the leaf are not intact. A fungus composed of a large number of branched white filaments, each filament consisting of a great many cells, has grown into and among the cells of the leaf. By the simple structure of these filaments, it can be seen that the fungus can absorb a good deal of the nutritive matter which the leaf-cells contain. This network of filaments is known as the *mycelium* of the fungus, and each filament is called a *hypha*. When this mycelium has become well established in the plant, it developes certain reproductive organs, which are the causes of the yellow patches observed on the leaf or stalk. From certain of its cells short hyphæ grow up towards the outside of the leaf, large numbers of them together, so that they make a small swelling on the surface. Each of these hyphæ forms a little globular body at its end which, when ripe, is orange-yellow in colour. The

BRITISH MUSEUM

ripening can be seen through the transparent epidermis of the leaf, and the yellow colour of the patches is the result. As these little bodies approach maturity the pressure under the epidermis gets greater and greater till it ruptures, and we have then the condition described above, when a touch brings away a little red or yellow powder. This powder consists of the globular bodies described above, which easily break away from the hyphæ on which they are first formed. Each one is called a 'spore'—sometimes from the Latin name of the fungus *Uredo*—the term *Uredo* spore is used to distinguish this form from other spores produced later in the plant's life. Each spore is a reproductive organ, and is capable of giving rise to a fresh fungus when it falls upon a suitable medium. Each mycelium will thus produce millions of reproductive bodies, so that the spread of the disease is not at all to be wondered at. A spore, when liberated from the parent plant and falling on a leaf, will, if the leaf be moist and the temperature suitable, germinate by putting out a tube or hypha from one or more spots in its surface; into these tubes the contents of the spore pass, the new hypha becomes divided up by the formation of cell walls, and it penetrates the tissues of the leaf, there giving rise by growth and cell division to a new mycelium, just like its parent. Under favourable circumstances this formation of spores and of mycelia goes on for weeks till the whole plant is permeated by the fungus.

If now we visit the same wheat field later in the year, just before the time for harvest, we shall find that the plants that were covered with patches of rust in the early summer are now mottled with not red but black patches. This is the stage which the farmer recognises as mildew. It is not another fungus that has attacked the corn. The same mycelium may be found to permeate the cells of the mildewed plant, but it does not now bear the yellow *Uredo* spores. With the inset of hotter weather and the ripening of the wheat, the tissues of the leaves and straw are not so filled with nutritive material as they were, but are drier and tougher. The fungus is having rather a harder time of it, and the result is that it produces another form of reproductive organ more suited to combat the harder conditions. If the black patches are now examined, as the yellow ones were before, they will be seen to be caused by a number of black hard-walled spores, each divided into two cells by a partition stretching transversely across them. Each is borne upon a short stalk or hypha, just as the *Uredo* spore was. These new bodies are known as *teleutospores*.

So far, the mildew stage appears to differ very little from the rust. There is, however, a great difference noticeable from this point. The *Uredo* spore could germinate upon the grass leaf, and could start a new mycelium which found a home in the same grass as the parent. The product of the germination of a teleutospore cannot do so. Indeed, its germination is often very long deferred; though produced in the autumn, it does not as a rule germinate till the following spring. Teleutospores then do not give rise to a mycelium like the parent, but to very much shorter hyphæ, one growing from each cell. These hyphæ are often called *promycelia* to distinguish them from the others. From certain of these cells, little stalked bodies of very delicate structure grow out, which are spores of a third kind. They are generally now called *sporidia*, though there is no doubt they are true spores as much as the others. The teleutospore does not germinate on the leaf of the plant, but is generally to be found on old decaying grass and straw on the ground.

The next stage in the mildew disease is a very curious one. The sporidium gives rise to a third mycelium, but this one cannot grow upon the wheat plant at all. For its further development, the fungus requires what is called a change of host. In other words, it must pass the next stage of its existence in another plant altogether. In the case of the wheat fungus, this other plant is the common barberry. For many years farmers had a sort of tradition that the cultivation of barberry bushes somehow was bad for wheat crops. This is now found to be based upon fact, for if no barberry bush is forthcoming, this particular crop of mildew can develop no further. If, however, the sporidium finds access to a barberry leaf, the new mycelium soon permeates it, and in due time produces its own special form of reproductive body, one differing in the mode of its development from all of the other three we have noticed already. The mycelium, too, does not work its way all over the barberry plant as it does throughout the wheat, but is confined to the leaves. If the latter are examined some time after infection has taken place they will be found to be swollen in places as if pustules were forming. These swellings get more prominent, and become brown in colour. They may, by the aid of the microscope, now be found to consist of a number of curious cup-shaped bodies opening on the under side of the leaf, each cup containing close-packed chains of spores, which are produced continuously at the bottom of each chain. The country people call these little structures *cluster cups*. Botanists know them as *Æcidia*, and the spores contained in them are hence called *æcidiospores*. The mycelium of the fungus in the barberry thus causes swelling of the leaf in places, destroying the cells of the leaf, and developing at these parts the cluster cups or æcidia. The æcidiospores, when set free by the bursting of the cup, cannot infect the barberry plant further, but they can infect the wheat plant again, giving rise on their germination to the rust which we examined first. In the life history of this pest, then, the very curious fact comes out that for it to run its course it must infect in turn both wheat and barberry plants.

Other fungi belonging to this family and showing the same peculiarity are known. They are not, however, of much agricultural importance.

The conditions which lead to the development of mildew have been already hinted at. The disease is most likely to occur on low-lying lands where mists are frequent. Free currents of air have a hindering effect on its progress, as in that of nearly all fungi, moisture and warmth helping it to spread. Agricultural practice shows that mildew is more frequent when wheat follows clover than when it follows other crops, and that dressing the land with farmyard manure and nitrate of soda often leads to its appearance. Mineral manures seem to be free from this danger.

The effect of mildew on the grain is to reduce its plumpness and greatly to impoverish it, and it causes the separation of the seed from the husk to be very difficult.

It is not easy to prescribe a proper treatment for this disease. Some lay great stress on not allowing barberry bushes to grow anywhere near to the cornfields. Even in their absence, however, mildew can make its appearance, and the *Uredo* stage can do a vast

amount of mischief. It is clearly a hereditary taint, and it seems as if the remedy must be looked for in the direction of choosing seed corn. No seed should ever be taken from mildewed plants, but great care exercised that the grains that are sown have a clean record. Mildewed straw as fodder, or as litter for stables, etc., should be carefully avoided, as the spores of the fungus can survive even being eaten by animals.

Another fungus which is found sometimes on wheat and other cereals is one known as *Fusisporium*. Like the mildew, it consists of a mycelium which grows throughout the tissues of the plant, and which at particular places produces its peculiar reproductive bodies.

It has a peculiar knack of infecting plants which are already weakened by the presence in them of mildew or other fungi.

The part of the plant which is the seat of the greatest injury is the ear, which becomes covered by a sort of gelatinous exudation, glueing the spikelets together, so that the growth and maturity of the grain becomes impossible. The spores of this fungus are elongated, sickle-shaped bodies, divided by septa into four or five cells. When mature, each of these cells separates from the rest, and germinating, gives rise to a new mycelium. Other species of this family affect potatoes, parsnips, and turnips.

Two other very obnoxious pests are also found affecting cereal crops, viz., *bunt* and *smut*. These have certain points of resemblance, and in many places are often confused with one another. They are, however, very different in many respects.

We will take first the disease of *bunt*, which is almost confined to wheat. Unlike the mildew, this disease is not at all easy to detect in its early stages. Perhaps the affected plants may appear greener and more flourishing than the others, for the stimulus of the parasite's presence at first is followed by greater production and activity of chlorophyll. The fungus affects especially the grain, and its spores are produced in the latter, replacing by a kind of black dust the proper farinaceous contents of its cells. A grain so affected can only be detected by an experienced observer, until it is ruptured. An expert can, however, see a difference in the grain which indicates what will be found inside. It is shorter and wider than the healthy one, its colour is dark-green and dull, instead of being pale buff or white. If it be cracked or injured, a black powder is found to be set free, which has a fœtid, offensive odour. Under the microscope, the black dust is seen to be composed of a number of thick-walled, prickly spores, which are connected together by very delicate mycelial threads. As the fungus ripens, these threads break up and perish, and leave only the spores to represent it.

The life-history of this fungus is full of interest, but a description of it would take up too much space for our present purposes, and we must, therefore, refer our readers for it to the standard works on Fungi.

The wheat plants almost always owe their infection with bunt to the spores being sown with the seed. They do not germinate in the seed while the latter is dry, but they do when the grain is planted in the damp soil. The plant is consequently infected when it is at its youngest state and least able to resist. The entering hypha soon ascends the stem, and keeps pace afterwards with the development of the plant until its spores are formed, as described, in the ears.

Bunt can be dealt with more easily than we should at first suppose. Developed in the grain, the spores are found mostly either in or on the surface of the seeds. The latter should be washed or dressed with some weak poisonous solution, such as sulphate of copper, or with sulphate of soda and subsequently powdered quicklime, by which treatment they can be killed.

The other disease, the so-called *smut*, is more widely distributed, occurring in wheat, barley, and oats, particularly the latter.

It can be distinguished from bunt by the effect it has on the ears of the affected plant. We have seen that bunt is not easy to detect; smut makes itself offensively prominent, turning the ears into blackened, shrivelled-up parodies of their natural appearance. The disease attacks the plant at its base, and makes its way upwards, the head, or panicle, of the oat having its lower grains first affected. The fungus affects not only the grain, eating away the farinaceous parts like bunt, but it also affects the leaves, or glumes, of the flower. When the grain is being attacked, it at first seems to be a white viscid mass, which is composed of closely-compacted cells in which the spores of the fungus are developed. As these ripen, they turn black much as the spores of bunt do. The fact that the glumes of the flower are attacked causes the whole ear to become black and powdery. The spores differ from those of bunt in three rather important respects. They are very much smaller, they are smooth and not prickly, and they have no offensive smell. In the life history of the two forms there are considerable similarities, but these are outside our present purpose.

Smut, like bunt, can best be prevented by dressing the seed with some chemical agent which will destroy the spores. Smut has a much more general distribution than bunt, being discoverable often in many grasses found on the farm. These may serve as sources of infection, but of course with clean and careful farming the danger can be minimised.

Another very troublesome disease affecting the cereals is the so-called *straw-blight*, which attacks the plants early in the year, and often causes the death of the plant. As its name implies, the substance of the straw is the part affected, and the pest is confined to the lower portion of the stalks. On these, generally only between the root and the first joint of the straw, brownish patches may be seen, which correspond to the development of a mycelium all through the solid part of the haulm there.

This disease does not injure the plants in the same way quite as the others hitherto described, but the cell-walls of the straw being pierced, there is brought about great disturbance of the flow of sap, and the plant dies of malnutrition. The life history of this fungus has not yet been fully made out.

Besides these diseases of vegetable origin, mention must be made of another known as *ear-cockle*, which is due to the attack of a small worm-like creature, known as a *nematode*, or thread-worm. This minute creature punctures the flower of the wheat at a very early stage in its development, and the stimulus causing a greatly increased flow of sap to the injured part, a growth is formed which resembles the galls found in the oak and other plants. This gall surrounds the nematode and grows to a considerable size. Inside it, the worm breeds with great rapidity. These galls then replace the grains of wheat in the ear.

Diseases of plants other than cereals must be deferred till next month.

To recapitulate—we see that

1.—When the relation between the organism or plant and its surroundings is not the proper one, disease results.

2.—We have two main classes of disease—those due to improper conditions of life, or *constitutional*, and those brought about by the attacks of parasites, either animal or vegetable.

3.—The second class becomes much more dangerous when disease of the first class has already attacked a plant.

4.—The chief diseases of the second class are brought about by certain forms of fungi, each of which has its own peculiar life history.

5.—The commonest of these fungi are mildew, bunt, smut, and the so-called straw-blight.

6.—In some cases galls are produced upon cereal plants which are attributable to the attacks of nematode worms.

(*To be continued.*)

TEACHERS' DRAWING LESSONS.

MODEL DRAWING FOR STANDARD V.

BY E. BUFFERY RIDGE,
Art Master under the London School Board.

LESSON XI.—VERTICAL LINES OF A CUBE.

BOARD with square drawn on it as in last lesson.

Four straight sticks, same length as sides of square. If nothing longer is at hand, use four twelve-inch rulers, but the square must be reduced to one foot, which is rather smaller than is advisable, although it is necessary that the scholars should see over the tops of the sticks. Some modelling clay, which can be obtained from any establishment supplying Kindergarten materials. Putty will do, but is unpleasant to use.

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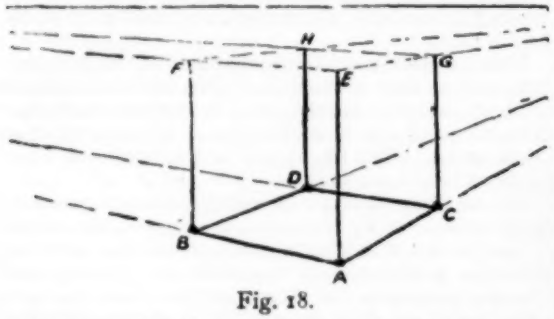

Fig. 18.

Draw a vertical line up from A. It will be longer than AB or AC, because it is not foreshortened, that is, it is not slanting away as AB, and the other lines are. Measure its length in proportion to AB, the longest of the lines which are already done. Mark the height at E. Place another stick at B; draw another upright line and compare the heights of the two. That at B is shorter, because it is farther away. How much shorter? Just enough to let the line EF meet the level line in the same vanishing point as AB and CD. Try it first by measuring AE, and marking a little less; then test with rulers to see if it is right. If not right, alter the point F by putting it in the vanishing line. BF is in every case shorter than AE. For the same reason, a third stick placed at C will appear shorter than BF, and a fourth stick at D shorter still. In each case correct the height obtained by measurement by using the ruler to draw the vanishing line. Notice that at H, the top of DH, *two* vanishing lines cross each other, and refer to the two similar lines which fix the bottom corner D. See that the vertical lines are well done. To finish, thicken the base and the four uprights.

LESSON XII.

A square prism standing on end on the floor or on a raised horizontal surface, not high enough to bring the top of the prism up to the level of the pupils' eyes. Each scholar to get an angular view.

The base on which the model rests is a square. Run the chalk round the four sides on the floor or board supporting the prism, remove the prism to show the square, then replace it.

Draw the two front lines of the square as in previous lessons, but without measuring their lengths (the lines being carried to the edges of the papers), then the front upright line, which may be made any convenient length, and then the eye-level at a height proportioned to the height of the upright line.

Refer to Lesson I. to obtain the widths of the upright surfaces which are seen, one on each side of the front edge.

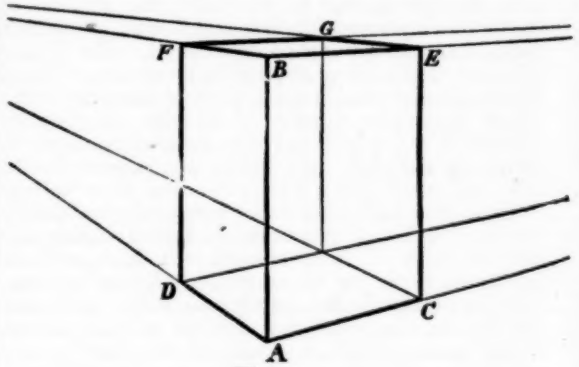

Fig. 19.

The upright lines so obtained give corners D and C. Test by measuring the relative lengths of AD and AC, compare them also with the upright AB, also be particular to note if the shorter and more inclined line AD reaches farther back, that is, farther *up* the paper than the other line AC.

Vanishing lines right and left from B will give E and F, and other vanishing lines from those points will cross in G, which should be vertically above the fourth corner of the base.

Lift the prism to one side so that the square of the base may be seen, and its shape compared with the square at the top of the prism, B E G F. The widths are same from right to left, but from front to back the top figure is much narrower than the bottom.

If it were high enough just to reach the eye-level it would have no width at all, but would be merely a straight line.

Thicken the lines which can be seen, four at the top, two at the bottom, and three uprights.

LESSON XIII.

The cube on blackboard as before. Angular view.

This model requires very careful work, the known regularity of the figure enabling the examiner to detect faults which would not be apparent in drawings of a square prism or other rectangular block, having varied lengths of side.

1. Draw the front upright edge any length, and from it obtain the eye-level.

2. Draw the other two visible uprights, measuring the widths from the middle line to each of the others very accurately in proportion to the fixed length of the middle line. The drawing then stands as in Fig. 20.

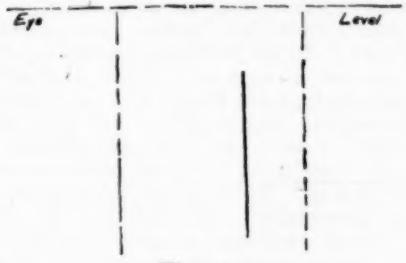

Fig. 20.

3. Measure the angles at the bottom and draw them, carrying the vanishing lines to the borders of the papers. Test lengths of base lines and position of corners as in Lesson XII.

4. Complete the figure as in Lesson XII. See if it *looks* right, that is, square, not like a prism standing up, which would show that the widths were too narrow, or like a prism or long box lying down, which would show that one or both of the side lines were too far from the middle line.

In future drawings of rectangular figures keep to the above order of work.

LESSON XIV.

Cube. Front view.

Draw the *top* of the cube with level line exactly as in Lesson VII. Then draw an exact square, A B E F, of which AB is the top line. Keep the distance between AB and CD narrow enough.

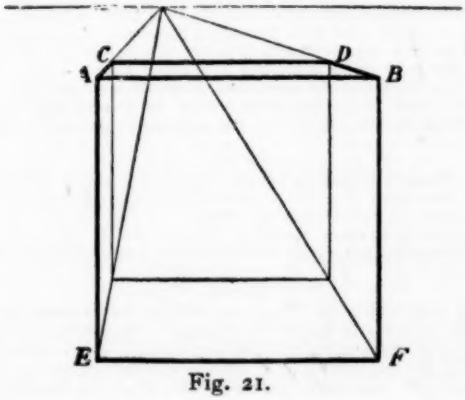

Fig. 21.

LESSON XV.

The square prism lying on its side. This presents no feature which has not been dealt with in previous lessons, and may appropriately be given to the class as a Test.

For other exercises obtain a few well-made ordinary bricks. Draw a single one in various positions, then form other figures by piling them up. Do not go beyond solid forms of simple construction in this standard. The relation between the length, breadth, and thickness—approximately 4 : 2 : 1—will be found most useful. Some examples are sketched below.

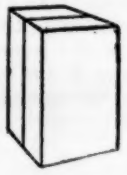

Fig. 22.

Fig. 23.

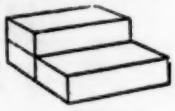

Fig. 24.

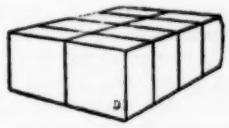

Fig. 25.

Fig. 22.—Two square prisms. Fig. 23.—Three bricks.
Fig. 24.—Three bricks. Fig. 25.—Eight cubes.

TACT
IN THE BUSINESS OF SCHOOL-KEEPING.

BY RICHARD BALCHIN.

THE nature of the relationship between a teacher and the local managers, often determines his life's comfort and peace of mind. Whether this relationship be satisfactory or not depends, for the most part, upon the tact shown in his dealings with these people. There is a fine field for the study of character here. There is great opportunity for the exercise of skill in adapting one's conduct and manner of speech to the various sorts and conditions of men and women one here meets. Those of us who have had many years' experience can look back upon occasional periods of unhappiness and anxiety, which would have been less bitter, or entirely avoided, if a little more tact had been displayed.

Local managers, though not always an unmixed good, yet serve a useful purpose. Through them, a large number of people become interested, in a direct manner, with the question of elementary education; and thus our system, resting upon a broad and extended basis, possesses greater stability. Also, it is surely to our advantage to be under the *nominal* control of many, than under the *real* control of one. For the many will seldom agree among themselves; with the result, that the teacher is happily left free to pursue his own course. Whereas the *one*, feeling that '*L'état, c'est moi*,' is in a position to enforce his own will.

Among the various types of managers there is one

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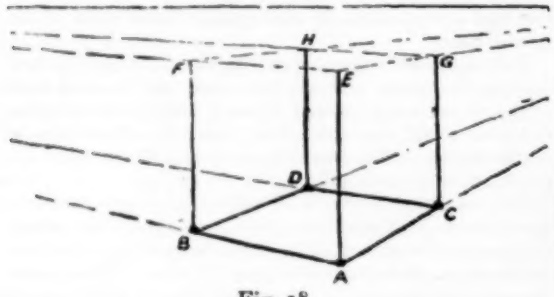

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The base on which the model rests is a square. Run the chalk round the four sides on the floor or board supporting the prism, remove the prism to show the square, then replace it.

Draw the two front lines of the square as in previous lessons, but without measuring their lengths (the lines being carried to the edges of the papers), then the front upright line, which may be made any convenient length, and then the eye-level at a height proportioned to the height of the upright line.

Refer to Lesson I. to obtain the widths of the upright surfaces which are seen, one on each side of the front edge.

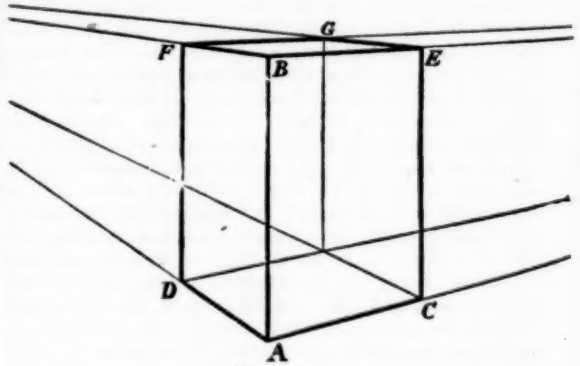


Fig. 19.

The upright lines so obtained give corners D and C. Test by measuring the relative lengths of AD and AC, compare them also with the upright AB, also be particular to note if the shorter and more inclined line AD reaches farther back, that is, farther *up* the paper than the other line AC.

Vanishing lines right and left from B will give E and F, and other vanishing lines from those points will cross in G, which should be vertically above the fourth corner of the base.

Lift the prism to one side so that the square of the base may be seen, and its shape compared with the square at the top of the prism, B E G F. The widths are same from right to left, but from front to back the top figure is much narrower than the bottom.

If it were high enough just to reach the eye-level it would have no width at all, but would be merely a straight line.

Thicken the lines which can be seen, four at the top, two at the bottom, and three uprights.

LESSON XIII.

The cube on blackboard as before. Angular view.

This model requires very careful work, the known regularity of the figure enabling the examiner to detect faults which would not be apparent in drawings of a square prism or other rectangular block, having varied lengths of side.

1. Draw the front upright edge any length, and from it obtain the eye-level.

2. Draw the other two visible uprights, measuring the widths from the middle line to each of the others very accurately in proportion to the fixed length of the middle line. The drawing then stands as in Fig. 20.

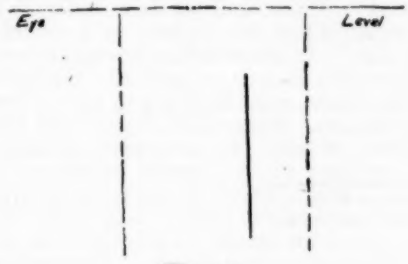


Fig. 20.

3. Measure the angles at the bottom and draw them, carrying the vanishing lines to the borders of the papers. Test lengths of base lines and position of corners as in Lesson XII.

4. Complete the figure as in Lesson XII. See if it *looks* right, that is, square, not like a prism standing up, which would show that the widths were too narrow, or like a prism or long box lying down, which would show that one or both of the side lines were too far from the middle line.

In future drawings of rectangular figures keep to the above order of work.

LESSON XIV.

Cube. Front view.

Draw the *top* of the cube with level line exactly as in Lesson VII. Then draw an exact square, A B E F, of which AB is the top line. Keep the distance between AB and CD narrow enough.

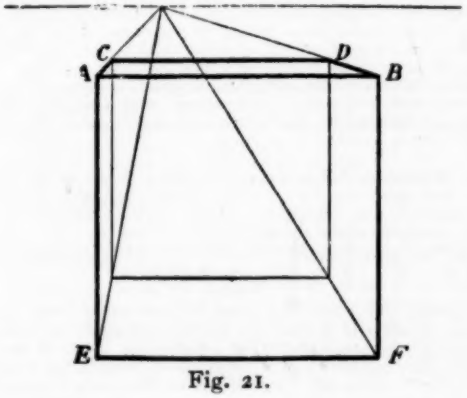


Fig. 21.

LESSON XV.

The square prism lying on its side. This presents no feature which has not been dealt with in previous lessons, and may appropriately be given to the class as a Test.

For other exercises obtain a few well-made ordinary bricks. Draw a single one in various positions, then form other figures by piling them up. Do not go beyond solid forms of simple construction in this standard. The relation between the length, breadth, and thickness—approximately 4 : 2 : 1—will be found most useful. Some examples are sketched below.

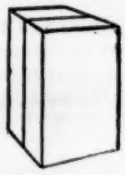


Fig. 22.

Fig. 23.

Fig. 24.

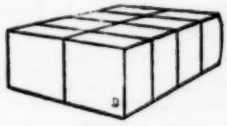


Fig. 25.

Fig. 22.—Two square prisms. Fig. 23.—Three bricks.
Fig. 24.—Three bricks. Fig. 25.—Eight cubes.

TACT

IN THE BUSINESS OF SCHOOL-KEEPING.

BY RICHARD BALCHIN.

THE nature of the relationship between a teacher and the local managers, often determines his life's comfort and peace of mind. Whether this relationship be satisfactory or not depends, for the most part, upon the tact shown in his dealings with these people. There is a fine field for the study of character here. There is great opportunity for the exercise of skill in adapting one's conduct and manner of speech to the various sorts and conditions of men and women one here meets. Those of us who have had many years' experience can look back upon occasional periods of unhappiness and anxiety, which would have been less bitter, or entirely avoided, if a little more tact had been displayed.

Local managers, though not always an unmixed good, yet serve a useful purpose. Through them, a large number of people become interested, in a direct manner, with the question of elementary education; and thus our system, resting upon a broad and extended basis, possesses greater stability. Also, it is surely to our advantage to be under the *nominal* control of many, than under the *real* control of one. For the many will seldom agree among themselves; with the result, that the teacher is happily left free to pursue his own course. Whereas the *one*, feeling that '*L'état, c'est moi*,' is in a position to enforce his own will.

Among the various types of managers there is one

that is present in every group, viz., the 'fussy, meddlesome manager, generally a retired tradesman.' This gentleman is, upon the whole, a not very difficult member to deal with. He is often a most useful man to have on the board of management, for he possesses a large share of common sense and business aptitude; and in committee displays considerable independence of action, and is by no means disposed, on all occasions, to blindly follow the lead of the chairman, like most of the others around the table. The unfortunate part of the business is that this man, being an excellent authority upon 'shop 'uns' and 'prime Dosset,' has persuaded himself that he is quite capable of giving counsel and advice on all the technicalities involved in the training of the human mind. He shows a large amount of interest in the school, for he is not called upon, at least in the case of London Board Schools, to pay any annual subscriptions, and his visits are rather frequent.

Now the teacher must not offend this manager; he must rather secure him as 'a friend on committee', but the visits must be few and far between. The following plan I have found effectual for this purpose :—

Upon the occasion of his first appearance, go with him round the school and arouse an interest in the work. He will make many suggestions, and be most generous in his advice. This, by the way, is about the only course his generosity takes. Receive all this with gratitude, and allow him to depart with feelings of absolute certainty that all he says is most valuable, and will undoubtedly be carried into effect. When next you meet, describe the various efforts adopted to improve the physique and health of the boys; such as swimming, football, cricket, etc. He will manifest the greatest possible interest in all this, and tell you that, in *his* opinion, a strong, well-developed body is 'of as much, if not more, importance for success in life as any amount of learning.' He has himself found this to be perfectly true. At the next visit, leave him to the assistants; but see that each assistant asks this manager for a subscription to the particular club in which the said assistant is specially interested. The probability is that a long interval will now elapse ere the next visit is paid.

The Clerical Manager, who is also a true Gentleman.

Taking a very active part in questions political, social, religious, and educational, I have, in the course of my life, met with a vast number of various types of men from princes to beggars; and quite the highest and noblest of them all has been a clergyman of the Church of England, who is at the same time a true Christian gentleman in the best sense of the word. On the other hand, the meanest, vilest, and most despicable scoundrel that I have ever known has also been a clergyman of that same church, but who was neither a Christian nor a gentleman. If a teacher is fortunate enough to have one of the former upon his board of management, his relationship with his managers is almost certain to be a happy one. Now, I would say to the teacher, make this man your bosom friend. Assist him in his parish work. Help in the Sunday school or in the choir. Do everything possible to knit heart to heart in the closest and most affectionate friendship. You will both benefit; and only those who have taken part in this work know the great happiness which springs from it. It is also of immense advantage every way that the most influential member of the committee should be your own personal friend.

The Clerical Manager, who is neither a Gentleman nor a Christian.

This man is simply a curse—an arch dissembler—a sneaking hypocrite—an outrageous liar, who never by any possibility acts straight and manly. I have met with such a one. He neglects his church, and his Sunday School. He is far too idle to do any real parish work, and only rouses himself up to anything like vigorous action, when engaged in doing somebody a cruel and grievous wrong. Then he may be said to be in his element and to enjoy life. His position as manager unfortunately places him where he can make his wretched presence felt, to the utter misery of the teachers in his school. How shall such a thing be treated? What shall we do to make life tolerable when we are forced into contact as a subordinate to such a man? In the first place I would say, 'Get out of the position as soon as possible.' But while compelled to remain, make friends with two or three of the other managers. Say as little as you need before this incarnation of evil. Be very polite, frostily polite. Make the boys show *excessive* politeness when he visits the school. Never say anything upon the question of religious belief, especially if your ideas are broad. For he feels it an intense pleasure to hurl at you a charge of infidelity from his proud height of orthodox championship. This is his cruellest weapon. Not that *he* really believes anything he teaches. Do not contradict him, nor attempt to set him right when he is wrong. Why should you take the trouble? Let him remain wrong. It is such creatures as these who make us feel truly sorry if it should ever come to be clearly proved that there is, after all, no place of future punishment.

(*To be continued.*)

—o—

NEW DICTATION TESTS.

Suitable for 'Unseen Tests' in Reading also.

Standard IV.

No. 146.

Girls and boys who sleep the happy sleep of infancy in luxurious cradles are fortunate indeed as compared with the red babies of the American plains, whose little beds are far from comfortable. The Indian cradle is used for a variety of purposes. It has generally the shape of a huge shoe, and when the child is laced up within its folds the baby looks more like a mummy than a living infant. When the tribe is on the move, then the cradle is strapped on to the mother's back, and some of the women in this position bear an unpleasant resemblance to a butcher carrying a joint on his tray.

No. 147.

For chapped hands it is a good thing when washing them to rub them thoroughly dry with a coarse towel. On retiring at night they should be well rubbed with either olive or almond oil, after which, powdered chalk should be well rubbed in. This will not only prevent chapping, but will render the hands white, and keep them so.

No. 148.

The work which the Committee will provide for the famine-stricken peasants in Russia will include hewing of timber in the forests and the accumulation of considerable stores of building material, the construction of railways and highroads, the extension of telegraphic communication, the erection of schools, hospitals, the building of steamers, and the construction of harbour works.

No. 149.

Travellers overtaken by a storm are very glad to seek shelter in the dark little stone houses of refuge which are built in the dangerous parts of the road. Every morning in the winter the good brethren set out with servants and dogs, and descend to the foot of the pass of the mountains. The dogs carry baskets of provisions strapped to their necks, in case any poor traveller is met with, that they may give him food and wine. Many a poor wayfarer has thus been saved from perishing in the snow.

No. 150.

Walking in sleep is sometimes brought on by undue excitement; by worrying oneself in business; by witnessing some thrilling theatrical performance; or by eating heavy suppers, and retiring late. Those who are of a nervous temperament are most likely to suffer. The best remedy is to be rational both in thought and action. They should not trouble themselves too much about anything, and should retire early, eat no suppers, and lie on the right side when sleeping, and not on the back.

No. 151.

Switzerland has the largest army of any nation in Europe in proportion to its population. No standing army is permitted by law, but all citizens are liable to serve, and in turn undergo annual military training. The State maintains a highly-trained staff and colleges, and in addition, military training forms part of the curriculum of every school. The reputation of the Swiss as a warlike nation is deservedly high.

No. 152.

To many persons, letter-writing is a wearisome task. How frequently we hear people remark that they don't like writing letters, but few dislike receiving them. There are some scarcely worth reading a second time, and others so interesting that they seem too good to burn, but are worth a place among our treasures. If, therefore, they can be made interesting, surely it is an art worth acquiring. A boy or girl who can pen a nice letter, can often be of use to his father or mother by writing for them when they are tired or pressed for time.

No. 153.

A Birmingham solicitor died, and by his instructions his favourite dog was buried with him. Recently, upon the death of his widow, the dog's body had to be exhumed to enable her to rest beside her husband, but was reinterred close by. The lady left instructions that her donkey should be buried by her side after the death of an old servant. She also left money to the dogs' home. The relations have been disputing the will, but the jury found in its favour.

No. 154.

Swallows follow the flies and gnats which usually delight in a warm stratum of air; and as warm air is lighter, and usually moister than cold air, when the warm stratum of air is high, there is less chance of moisture being thrown down from them by the mixture with cold air, but when the warm and moist air is close to the surface of the earth, it is almost certain that, as the cold air flows into it, deposition of water will take place.

No. 155.

Our fathers had a strange fancy for being buried under the floor of churches where they worshipped; had they been living now, they would have thought about such a matter as we do, and would have acted accordingly. All the City churches should be cleared of human remains. Not long ago a London rector declared that he had heard the coffins falling about in the vaults while he was conducting service. There is another London church where the coffins are piled nearly twenty feet high.

No. 156.

The best time for taking a bath is *just before going to bed*. 'There is no practice more objectionable than to go to bed closely wrapped up in the dust and dirt that accumulate on the surface of the body during the day; nor is there anything I know of so conducive to sound sleep as a tepid bath just before getting into bed. I have many times known bad sleepers become the best of sleepers from the adoption of this simple rule.'

No. 157.

When members of the royal family are present at dinner they sit on either side of the Queen, except when foreign royalty of higher rank is present. When the lady-in-waiting, or one of the maids of honour, dines with the Queen, it is by special command; a message is sent on the morning of the day, desiring her to do so. She does not use the gold plate at Christmas, as is popularly supposed; indeed, it is only used when state dinners are given in the Waterloo Gallery at Windsor, and of which there have been but few during the last twenty years.

No. 158.

As regards the proper hour for getting up in the morning, those who may be considered good authorities are not agreed. It depends to a large extent upon health, temperament, and employment; but we may be sure that the earlier the hours we keep the better it is for us. Someone remarked to the Duke of Wellington, on seeing his little camp bed, that it was almost too narrow to turn upon. 'When one turns in bed,' replied his grace, 'it is time to turn out.'

No. 159.

The strongest incentive to character-building is the example of those whom we love. Every boy, while his knowledge is confined to his home, sees a hero in his father; every girl believes her father the finest type of man; 'mother' represents to the children the perfect woman. Can money, or place, or power, gained by the sacrifice of truth or honour, ever compensate a child for the loss of perfect trust in the character of a parent?

No. 160.

Perils at sea are multiplied when accidents occur in the gloom of night. As a means of lessening these perils, it is suggested that each passenger steamer be compelled to carry search lights, and be thus enabled to illuminate the sea on all sides of the ship to discover the whereabouts of unfortunate wretches who would otherwise be hopelessly struggling to attract the attention of persons able to save them.

No. 161.

There sometimes goes out of this life a character so finished, so complete, that one looks with envy at the children who inherit as a legacy the memory of such a parent. We hear a great deal of the moral education of children; the greatest moral educator in the home is the character of the parents. If children know only truth, honour, the law of kindness in the home, it gives them their standards; it makes the foot-rule by which men and women are measured; it represents the only world in which they could live.

STANDARDS V.-VII.

No. 130.

The Prince and Princess of Wales had a pleasant task on Saturday afternoon, when they received, in the Marlborough House gardens, the 'second thousand' of the nurses who belong to the Royal National Pension Fund, the 'first thousand' having attended a similar ceremony about a year ago. In the interval, it appears from the speech of the Prince of Wales, the Society has made solid progress. In addition to the thousand new policies which have been taken out, the financial stability of the concern is based upon an invested capital of one hundred thousand pounds.

No. 131.

Mr. Balfour, in opening a bazaar yesterday afternoon in aid of a local church and schools, said great claims were being made upon Churchmen in connection with elementary education. He was a member of the Government responsible for carrying the Free Education Bill, and he did not shrink from that responsibility. He thought it would confer a great boon upon the poorer classes. It would be an enormous assistance to the poor voluntary and denominational schools, and on that ground Churchmen ought to be glad that the Bill was passed. At the same time there were large and important districts in which the measure bore hardly upon Church schools, and consequently a special effort was needed on the part of those who supported those schools.

No. 132.

Several organisations are already at work to provide district nurses to visit the sick poor in their own homes. One of these employs young women of the peasant class, of respectable character, without much (if any) hospital experience, but who have had a fair training in district work; while another insists that the nurse should have at least twelve months' training in a hospital, and six months in district work. The first is the outcome of the efforts of several philanthropic ladies, and the Council of the Jubilee Fund has federated it in a measure with the Queen's nurses. The nurses of the peasant class undertake domestic as well as nursing duties in the cottage homes, and their cost is not half that of the trained attendant from the hospital.

No. 133.

The Duke of Cambridge said:—'All who have come here to-day to assist in the inauguration of this undertaking, and to admire this handsome building, with its gymnasium, swimming bath, lecture hall, reading rooms, its chemical, engineering, electrical

and art departments, and, not least, its extensive school of cookery, must feel that a private corporation which alone called into being, initiated, established, equipped, and adequately endowed this great institution, at an outlay of a quarter of a million from their private funds, over which they have complete control, has accomplished a work which is without parallel, even amongst the many achievements of the great guilds of the City of London, in the interests of the country's welfare.'

No. 134.

The Electric Exhibition lately opened at the Crystal Palace is one of the best and most interesting ever held. An attempt is made for the first time to show all the possibilities of electricity as a motor, and all sorts of electric carriages and conveyances are shown. Beyond this, great attention is paid to the subject of electric lighting in private houses. This item will not be pleasing news for the gas companies, for the new light is making its way steadily but surely in the metropolis, and experts hold that in five years' time its rival will have been driven out of the field. One of the features, is the illustration of the latest progress made in submarine mining, and all the latest destructive engines are shown, and, so far as possible, utilised.

No. 135.

The Colonial Secretary had something very interesting to say on technical education in opening an exhibition at Ipswich on Saturday. Observing that when Vice-President of the Education Department he discovered in the Midlands that, owing to technical education, British workmen were replacing foreign artists previously engaged by the great workshops of china and pottery, he urged that if this could be done in one business it could be done in another. He was glad to see models, house decoration, carving, leather work, and drawing included in their programme, and speaking, from his experience at the Science and Art Department, of the success that had attended the efforts to revive lace-making in Ireland, suggested that lace-making might be profitably pursued in many parts of this country.

No. 136.

The late Emperor of Brazil had to 'set an example,' and he took care to make it of the best the world had to offer, in culture, political wisdom, and the purity of private life. He was accessible to all; the receptions at the Palace were often no more than vast audiences of men with a grievance. The Emperor passed down the long gallery and gave an ear to every sufferer's tale. He did wonders for the material development of his country; half the roads and all the railways are the creation of his reign. His wisdom and conduct brought Brazil to the fore, and his personal influence redeemed her from the obscurity which is the lot of so many of the South American States.

No. 137.

The famine in Russia is no longer a distant and isolated misfortune but a terrible national calamity which threatens the empire, and the tone of the whole Russian Press indicates that the intelligent classes and the Government are fully alive to the danger. The attempt to show that it is a money famine proves nothing. When whole provinces are reduced to want by a failure of crops, it requires not only money and bread, but a most elaborate system of relief, to cope with their needs. The suggestions as to the Government providing work in road-making can only touch a small proportion of the sufferers.

No. 138.

In the 16th century it was customary for country people to go forth at an early hour upon May morning to gather flowers and hawthorn branches with which to decorate every door and window in the village. This expedition was called 'going a-Maying.' The fairest maid of the village was crowned with flowers as Queen of the May, and dancing and festivity were the order of the day. Maypoles were raised in towns and villages, and the picturesque dancing round them added materially to the enjoyment of the festivities in celebration of the opening of the merry month of May. The last Maypole in London stood opposite Somerset House in the Strand, and was removed in 1717.

No. 139.

The Leader of the House of Commons visited the Glasgow Royal Exchange, and, in response to loud calls for a speech, said: 'Your appeals I cannot resist, though I do not think there is really anything which I can say, except to thank you for the invitation which you gave me to see this magnificent building, and to express my hearty appreciation of the kind manner in which you have received me. I speak now to the representatives of one of the greatest commercial cities of the world. I shall not touch upon political matters, but upon this point we are all agreed—that while the interests of the country require good government, the commercial interest above all requires a Government which shall administer the affairs of the country with discretion, and, while it maintains the dignity and safety of the Empire, shall preserve it from unnecessary wars.'

No. 140.

As a private gentleman the ex-Emperor of Brazil was endowed with singular accomplishments and graces. His untiring zeal in sightseeing and in adding to his store of information during his residence in European capitals was the subject of many an amusing and kindly tale. His compliment to a young Brazilian whom he met in the London streets at five o'clock one morning illustrates his simplicity. 'Admirable youth,' he said, 'to be up so early!' During his brief, but by no means joyless period of exile he bore himself with a fine mixture of dignity and resignation. Prostrated at first by the reverse, he soon went back to his old literary and scientific pursuits. But he was still loyal to Brazil. 'If they want me, I will return,' was his touching remark, when the news came of the later revolution.

No. 141.

A competition has for a long time past been carried on among the English ironmasters as to the degree of thinness to which cold iron could be rolled. In one case the sheets have been rolled to an average thickness or thinness of the eighteen-hundredth part of an inch; in other words, 1,800 sheets of this iron, piled one upon another, would measure only one inch in thickness. And this marvellous fineness of work may be more readily understood when the fact is borne in mind that the great number of 1,200 sheets of thinnest tissue paper measures a slight fraction over an inch. It also appears that these wonderful iron sheets were perfectly smooth and easy to write upon, nothwithstanding the fact of their being porous when held up in a strong light.

No. 142.

The treatment of cramp consists in overcoming the contractions into which the muscles have been drawn by constant friction with the hand or flesh brush, rubbed in the direction of the muscular fibres; or in severer cases, by using with the friction, brandy, turpentine, or dry mustard, though, when procurable, the most benefit will be derived from the hot bath. For the cramps induced by bathing, the hot bath or hot bricks are indispensable; while for those that arise from stagnation of blood, or other causes during sleep, extension of the leg while the foot rests on the cold hearthstone, and enveloping the limb in a wet towel, will be generally found to yield immediate benefit.

No. 143.

Water which is hot of course cannot freeze till it has parted with its heat; but water which has been boiled will, other things being equal, freeze sooner than water which has not been boiled. A slight disturbance of water disposes it to freeze more rapidly; and this is the cause which accelerates the freezing of boiled water. The water that has been boiled has lost the air naturally contained in it; which, on exposure to the atmosphere, it begins again to attract and absorb. During this process of absorption, a motion is necessarily produced among its particles, slight certainly and imperceptible, yet probably sufficient to accelerate its congelation.

No. 144.

Parents of the educated classes who have not much money are now beginning deliberately to choose the Army as a profession for their sons. They can see from a paper on 'The Advantages of the Army,' obtainable gratis at any post-office, that even if their sons never get commissions, there are open to them positions in the Army better than that of a clerk, or of an unsuccessful professional man. And if they are sensible people they will know that there is no honest position in life so humble that a good man cannot raise it, just as there is none so exalted that a bad one cannot debase it.

No. 145.

There are other matters connected with the development of electricity amongst the world's industries which, although not electrical inventions, are fairly entitled to rank as necessary adjuncts. Such are the numerous examples of steam and gas engines. Those devised for electric lighting or current-generating purposes are very fine, and show a keen perception on the part of their designers of the requirements of engineers. It is obvious, too, that the edict against smoke which has gone forth in recent legislation has begun to attract the inventor, for there is shown an ingenious and simple device of discs placed in the path of the flame of the furnace to the flue, whereby the hot air and unconsumed gases are mixed together and consumed.

NEW COMPOSITION STORIES.—STANDARD V.

Suitable for 'Unseen Tests' in Reading also.

No. 182.

A TRUE HERO.—A short time since an engine-driver in America, at the cost of his own life, saved the lives of six hundred passengers. The train under his care was travelling at the rate of thirty-five miles an hour, and the fireman opened the furnace door to make up the fire. The back draught forced the flames out so far that the locomotive car caught fire, and drove the driver and stoker over the tender into the nearest passenger carriage, the engine being left without an attendant. The flames increased with the increase of speed, and it soon became evident that the whole train was in serious danger of being consumed. The passengers were panic-stricken: to remain was to be burned alive; to jump off was certain death. The only hope of safety lay in stopping the train, and this the engine-driver resolved to do. Plunging into the flames, he climbed over the tender, and reversed the engine. When the train stopped he was found in the water tank, with his clothes burnt off, his face disfigured, and his body frightfully injured. Half conscious, he was removed to the hospital, where death in a few days put an end to his sufferings.

No. 183.

A GHASTLY STORY.—A terrible story comes from North Queensland about a man who was lost in the bush. He had used up all his water, but by-and-bye, fortunately, he came to a waterhole where he slaked his thirst and found the road again. He had still some thirty miles to go, however, and he had nothing whatever to carry water in. Of course, it would have been madness to attempt to travel thirty miles on foot under a North Queensland sun without any water, so his ready invention came to his aid. He had been horrified a short distance back by the skeleton of a man, who had evidently been dead several years. He went back and got the skull, plugged up the eyeholes with clay, and filled it with water. He then tramped that thirty miles on the water contained in the skull! Can anyone imagine a more ghastly and frightful idea than this?

No. 184.

AN ASTONISHING PREDICAMENT.—A well-known temperance lecturer was once visiting a gentleman who pressed him to accept a few choice cigars. Not wishing to displease an old friend, he accepted some, placing them in the lining of his hat, and forthwith forgot the circumstance. Shortly afterwards, in a distant neighbourhood, he addressed a band of scholars and their friends on the lawn. After dwelling on the evils of intemperance and smoking, he said—'Now, my friends, three cheers for the temperance cause,' and whirling his hat round his head, out flew the cigars in all directions. The astonishment of all present can be more easily imagined than described.

No. 185.

THE MICE AND THE OYSTER.—Two little mice, who lived near the sea-shore, set off one morning in search of food. They rambled about until they got to the beach. They soon espied a fine, large oyster, with its shell half open. The mice were very hungry, and here was a splendid dinner on a fine mother-of-pearl plate. They both put their little heads inside the shell to feast on the dainty before them. Then there was a strange accident. Whether the whiskers of the dinner-hunters tickled the oyster, or whether he got angry, we cannot tell. But down came the upper shell. The mice were trapped, and neither scratching, biting, nor squeaking could get them out. This funny trap with its two prisoners, carefully preserved in spirits of wine, is to be seen in a bottle on one of the shelves in Whitstable Museum.

No. 186.

THE HELP OF TWO WORDS.—A little boy of eleven sat in the garden one afternoon deep in the story of a boy who, by his daring, had saved the lives of two men. 'Ah,' thought he, 'why cannot I do these great things, but I have never had the chance.' As he was still thinking over his story, he overheard a conversation between two men. Just behind where he was sitting two paths met; one led to the inn, the other up on to the hills. The younger man had evidently signed the pledge, and the older was trying to laugh at him, and make him break it, and to go with him to the public-house. The younger man resisted some time, but at last gave in, and agreed to go with his friend while he had a glass of beer. The boy was greatly interested and determined to follow the men. At the public-house the elder man called for drink, took some, and then handed it to his friend. He refused at first, but was just taking the glass when a small voice said, 'I wouldn't.' The man started; he had not seen the child. 'What do you say?' he asked. 'I said *I wouldn't*,' repeated the child. The elder man held up his hand as if to strike him. 'God bless you, and I won't,' said the younger man. Taking the child by the hand, he went out, heedless of the taunts of his companion. 'Surely,' said he, 'Heaven has sent this child to save me.' Those two words, bravely uttered by the child, saved the man from what probably would have been a life of misery. He learnt a lesson that day never to be forgotten, and one that he treasured in his memory ever after.

No. 187.

FORTUNE AND THE BEGGAR (A Russian Fable).—A wretched beggar, carrying a ragged old wallet, was creeping along from house to house, and as he grumbled at his lot, he kept wondering that folks who lived in fine houses should be always unsatisfied, however full their pockets might be, and that they should go so far as often to lose all they have while craving for and laying their hands on new riches. At this moment, Fortune suddenly appeared to the beggar, and said, 'Listen! I have long wished to help you. Here is a lot of ducats I have found. Hold out your wallet and I will fill it with them, but only on this condition—All shall be gold that falls into the wallet, but if any of it falls out of the wallet to the ground it shall all become dust. Consider this. I have warned you beforehand. Your wallet is old, don't overload it.' The beggar is overjoyed. He opens his wallet, and a golden stream of ducats is poured into it. 'Is that enough?' 'Not yet. Just a little more.' 'There, it's full. Take care, the wallet is going to burst.' 'Just a little more,' said the beggar. But at that moment the wallet burst, the treasure fell through and turned to dust. The beggar had now nothing but his empty wallet and was as poor as before.

No. 188.

THE CHINESE DOCTOR.—A somewhat vexatious law in China compels every doctor, after dark, to hang up in front of his house as many lighted lamps as he has sent patients into the next world. One evening, a European, who was staying in Pekin on business, set out in search of a doctor for his wife, who had been suddenly taken ill. He called at the houses of a good many, but was deterred by the large number of lamps exhibited before each. At length, after tramping about for several hours, he came to the house of a doctor, where only three lamps shed a melancholy light over the entrance. Our happy European dashed into the house of this excellent man, awakened him, and took him off to his lodgings. 'I presume you are the best doctor in the city?' he said to his companion as they went along. 'What makes you think so?' 'Because you have only three lanterns hung over your door, while your colleagues have dozens displayed on their house-fronts.' 'Ah! is that the reason?' calmly replied the doctor. 'The fact is, I only lately set up in practice, and have had but three patients!'

No. 189.

FUN ABOUT A NOSE.—Deacon Cole is well known as being provided with an enormous nose. On a recent occasion, when taking up a collection in the church to which he belonged, as he passed through the congregation, every person to whom he presented the box seemed to be possessed by a sudden and uncontrollable desire to laugh. The deacon did not know what to make of it. He had often passed the plate round before; but no such effects had he witnessed. He was fairly puzzled. The secret, however, eventually leaked out. He had been afflicted a day or two before with a sore on his nose, and had placed a small piece of sticking plaster over it. During the morning of the day in question the plaster had dropped off; and the deacon, seeing it, as he supposed, on the floor, picked it up and stuck it on again. But, alas! he picked up instead, one of the pieces of paper which the manufacturers of cotton, paste on the end of every reel, and which read—'Warranted 200 yards long.' Such a sign on such a nose was enough to upset the gravity of any congregation.

No. 190.

THE CROCODILE'S EGGS.—A droll incident occurred some time since with regard to some crocodiles' eggs, which at the request of a gentleman in England had been collected, put into a barrel with sand, and placed with various goods in a warehouse ready for shipment when the opportunity arrived. The interval was so long that the cask of eggs was forgotten, till one morning a strange noise was heard, like stifled knocking; the black workmen were alarmed, but their master insisted on everything being removed until the cause of the noise was ascertained. After taking down several packages, the cask, which was undermost, was left free, and in half-a-minute the head of it was burst open, and several little black-looking heads emerged from the sand. The crocodiles were hatched, but the workmen giving themselves no time to consider about the matter, imagined them to be so many demons, started off with the utmost speed, and left their master to see to them as he best could.

No. 191.

THE CRAFTY HEDGEHOG.—A hedgehog and a hare once had a quarrel. The hare, feeling sure of an easy victory, offered to settle the dispute by a race. The winner was to be declared to be in the right. Much to pussy's surprise, the hedgehog immediately agreed. The queer pair of racers met at the appointed place, and started level. Remembering how one of his ancestors had gone to sleep, and been disgracefully beaten by the tortoise, the hare ran at full speed towards the goal. But what was her dismay to find the hedgehog already there. She was obliged to confess herself defeated, but next day begged her opponent to explain how it was done. 'Oh,' said the crafty hedgehog, 'my wife was at the goal when we started off, and, as we are so much alike, you mistook her for myself.'

No. 192.

HOW SHE SAVED HER COALS.—An old lady, who lived near a colliery, had a little garden in front of her house. One year she set some seeds, and, in order to keep the birds away, fixed up a stick and put an old hat and jacket upon it. As the men who drove the carts full of coal passed her house they amused themselves by throwing lumps of coal at the old hat. At first the woman was much annoyed at this, and tried to stop them. After a time, however, she became very quiet about it because each day she was able to gather up sufficient coal for her fire, and in this way saved her own coals and money also.

No. 193.

THE OMNIBUS DRIVER'S PET.—An omnibus driver one day found a little rat in the hay-loft. As it was of a piebald colour, he spared its life, and took it home. In course of time it grew quite tame, and became a great friend of his children. At night it used to lie on the rug before the fire, and when the fire went out it crept into its master's bed. The driver taught it to obey him, and at the word of order it would jump into his top-coat pocket and stay with him all day. Occasionally its owner placed it in the boot of the omnibus to watch his dinner, and if anyone dared touch the food, it would fly at him out of the straw like a fierce tiny terrier. When the rat had grown old and white, and had lost its teeth, it still remained the family favourite, and was fed just as if it had been a baby, for it was as helpless as one. Few rats have been so well taken care of as this driver's pet.

No. 194.

PRESENCE OF MIND.—Two lads were playing near the top of some very dangerous cliffs on the coast not long since. They had spent their time in trying each to outdo the other—first at racing, then leaping, and afterwards at hopping. After pausing for a few moments to consider what should be done next, one of them said, 'Let us see which can keep hopping backwards the longest.' The other agreed, and both started. One of them soon fell over a stone, and after rubbing his head got up to look at the other. To his horror he perceived that his friend was hopping backwards close to the edge of the cliff, and in another one or two hops would be over. There was no time to make him understand a warning, but with admirable presence of mind he fell flat down on his face shouting, 'I'm killed!' The other immediately sprang forward to his assistance, when he learned that whilst his companion was uninjured, he himself had narrowly escaped with his life.

No. 195.

GENEROUS REVENGE.—A young man, wishing to get rid of his dog, took it down to the River Seine. He pulled into the middle of the stream in a boat, and then threw the poor animal into the water. It tried again and again to climb up into the boat, but the man continually pushed it back into the water again. In doing this he lost his balance and fell into the water himself. The dog might now have got into the boat, and have left its master to his fate; but as soon as the half-drowned dog saw him struggling in the stream it suffered the boat to drift away, while it held him above water until assistance arrived, when both their lives were saved.

No. 196.

A FALSE ALARM.—A commercial traveller who was staying at a small country hotel happened to have a large amount of money in his possession. Just before retiring to rest, he took the precaution to look under the bed to see that no intruder was concealed there. He was horrified to see, by the dim light of the candle, the proportions of a massive human head and shoulders half hidden among a pile of band-boxes and other rubbish. The gentleman seized his money and his revolver, and called upon the robber to come forth. An ominous silence succeeded, and it occurred to the traveller that the villain was taking deliberate aim to shoot him, and he instantly blazed away with his pistol. The report alarmed the house; landlord and chambermaids rushed in; the guest pointed out the place where the robber was concealed; and an investigation discovered the cause of the alarm in a bust of Oliver Cromwell, with a bullet-hole through the middle of his forehead. The landlord claimed a guinea damages, and told the traveller that he might keep the bust.

No. 197.

AN ARAB FABLE.—A miller was one day very startled to see a camel push its nose in at the window of the room in which he was sleeping. 'It was very cold outside,' the camel said, and he only wished to get his nose in. So the nose was let in, then the neck, and at last the whole body. Presently, the miller found the camel a very inconvenient companion in a room not large enough to hold both. So he complained. 'If you do not like it, you may leave,' said the camel; 'as for myself, I shall stay where I am.' Moral:—A bad habit once acquired, will soon grow upon us, until it is a very difficult matter to throw it off.

—o—

NEW READING TESTS.

Suitable for 'Unseen Tests' in Dictation also.

STANDARD III.

No. 1.

Most animals, as is well known, can be educated or trained to a high degree of intelligence. When dogs watch partridges and hares without hurting them, or a wild cat that has been trained to do so takes care of a tame sparrow and shows no desire to gobble it up, surely they exhibit signs of very decided docility.

No. 2.

The Iron Duke was very fond of children, and he had a way of his own of showing it. He always kept a certain number of half-sovereigns with a hole bored through each, through which a blue ribbon was passed. After paying him a visit it often happened that the old man hung one of these tokens round the neck of his young friend.

No. 3.

H.M.I.'s TEST.—Somehow or other we have got to look upon the cow as a stupid sort of creature, but it may be doubted whether this is not a great error of judgment. Possibly if we could hear the gossip that goes on in the cowhouses or the green fields, we might discover that the cows have as low an opinion of man. And we know how very wrong *that* would be.

No. 4.

A farmer noticing that his store of nuts was growing smaller every day, soon discovered that a little red squirrel had found her way into the granary through a hole below the roof, and was busily stocking her home with the stolen nuts. Being curious to learn how quickly the squirrel worked, he removed all the nuts except twenty. Within six hours every nut had vanished.

No. 5.

Some of the crabs that dwell about the shores of Great Britain have a remarkably curious habit. They cover the upper surface of their body, more or less completely, with pieces of sea-weed and of plant-resembling animals. By means of their nippers they cut off bits of different sizes and fasten them to the more exposed portions of their bodies.

No. 6.

H.M.I.'s TEST.—The natives were coming along pretty quickly. They were evidently tracking the

settlers with that care and success which a savage, or a woodsman, or a scout possesses in such a great degree. Fortunately the dry rock permitted no impression of footsteps, or the hiding-places of the children, or the children themselves, would have been almost immediately discovered.

No. 7.

The Press of Life—in stress and strife
  Its mighty wheels resound;
And actions there are printed fair
  On countless hearts around!
Then kneel and pray that every day,
  By golden thought and deed,
A line may add to cheer the sad
  And help the weak at need.

——o——

CONVERSATIONAL DRAWING LESSONS FOR INFANTS.

BY MRS. E. MORTIMER,

Author of Practical Kindergarten Lessons for English Infant Schools; Lecturer on the Kindergarten at the Home and Colonial Training College.

Oblique Lines.

XXII.—Combination of different lengths (1 to 5 squares.)

The children, having had exercises with the oblique lines, first 1 square long, then 2 squares, then 3 squares, then 4, and then 5, now combine these different lengths to form patterns. By this means the children, while still using the same lines with increasing interest, are really grasping ideas of simple pattern-making or elementary design.

NOTES OF A LESSON ON XXII—18.

The children to have drawing-books and nicely sharpened lead pencils, and the teacher a chequered blackboard. The teacher to question the children on the different kinds of lines they have drawn—lines to be named and examples made by them on the board (vertical, horizontal, oblique).

Of what use are the squares in your books? We draw vertical lines on the upright sides, and horizontal lines on the other sides. Where do you draw the oblique lines? From corner to corner across the square. What is the name we give to the line that goes through the square from corner to corner? The diagonal. Then your oblique lines have been diagonals of squares. Have you always drawn them in the same direction? No. Sometimes we began at the top right-hand corner, and drew to the bottom left-hand corner, and sometimes we began at the top left-hand corner and drew to the bottom right-hand corner. Have you always drawn them of the same length? No. Sometimes of 1, 2, 3, 4, and 5 squares in length. Yes, and if you look back at your exercises you will find you have had the different lengths in the same pattern.

To-day we are going to draw another pattern with the five different lengths.

Look at the blackboard and count while I point to the squares. Yes, I have stopped. Where have I stopped? At the sixth square. From the right top corner of that square I am going to draw a line. Through how many squares have I drawn it? Yes. Now you can count and draw a line like it. Which way did we draw the line? Downwards and to the left. Very well, now watch again. Where have I put the chalk? At the top of the line. From this point I am going to draw another oblique line. Is it like the last? Yes. No. I hear some of you say 'yes' and some say 'no,' so we must see which is the right answer. We will begin with the answer 'yes.' Why do you say 'yes?' Because it is an oblique line of the same length as the first. That is quite right. Now why did you say 'no?' Because it is not in the same direction. That is also right. So you see you were all partly right. It is an oblique line of the same length, but goes in a different direction. Which way does the last one slant? Downwards and to the right.

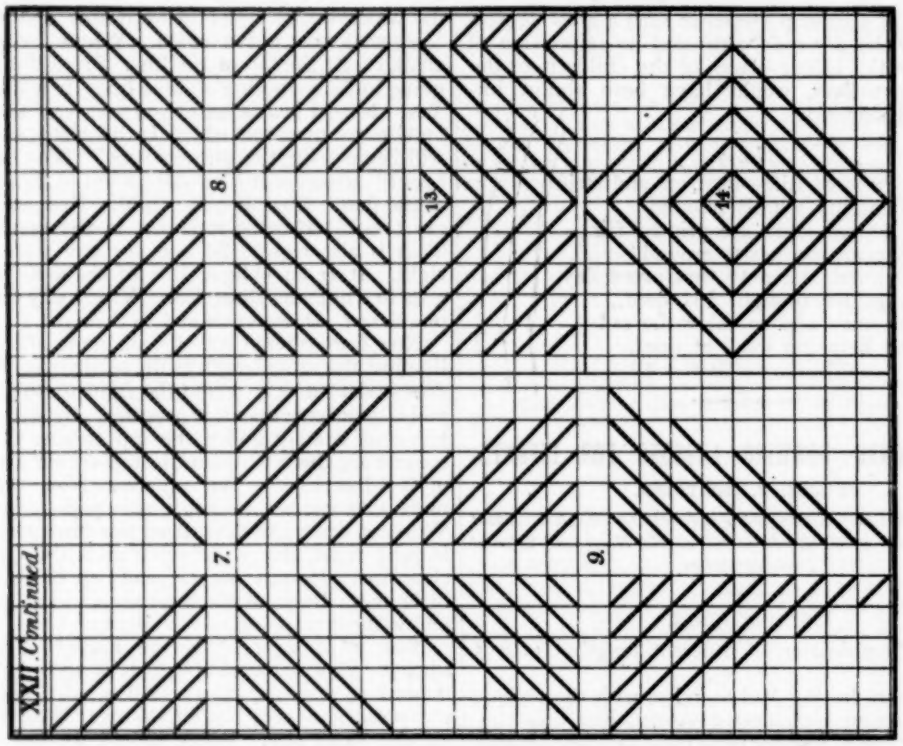
Now from where I left off I am going to draw another line just the same length as the other two. Which way does it slant now? From the right to the left. Yes, and if you have drawn it properly, you will see that it leaves off exactly under the top corner. How many squares are there between the top corner and the end of the last line? Ten squares. Now there is one more line wanted to finish this part of the pattern. Who can come and draw it on the blackboard? That is quite right, Harry, only you must draw one steady clear line. It must not be made up of two or three little ones. Begin at the beginning and go quite to the end without stopping.

Now what figure have we made? Yes, it is a square. How do you know it is a square? Because it has four sides and they are all equal. Yes, but what else must you say? Well, Mary? The corners are all the same size. What should we say instead of corners? The angles. And what kind of angles are these? Right angles. The children should then repeat, 'The square has four equal sides and four equal angles, and these are right angles.' Do you always see the square like this? No, this one is placed corner ways. How else can it be placed? On one of its sides.

Now we will go on with our drawing. Point to the top corner and count one square lower down, and then look at the blackboard and see what I am going to do. Well? What have I done? Drawn another line the same length as the first. You draw one like that in your books. What can we say of these two lines? That they are parallel. What does that mean? That there is the same space between them all the way along. Now look again. You have drawn another line the same length on other side. From where did I start? On the left side, one square below the top corner.

Beginning at one square above the bottom corner on the right side, I am going to draw another line parallel to the third line. All of you do the same. Now draw a line parallel to the fourth one and we shall finish this part of our pattern. Now look at the four lines you have just drawn. How long are they? Five squares long. What can you see at each corner? A small square. How many small squares are there? Four. What is in the middle? A larger square. How long are the sides of this square? Three squares long. What else do you see in addition to the four little squares and the centre square? Oblongs. Yes. How many oblongs are there? There are four. How does the oblong differ from the square? How does it resemble the square?

We have only two more lines to draw to finish our


XXII. Continued.
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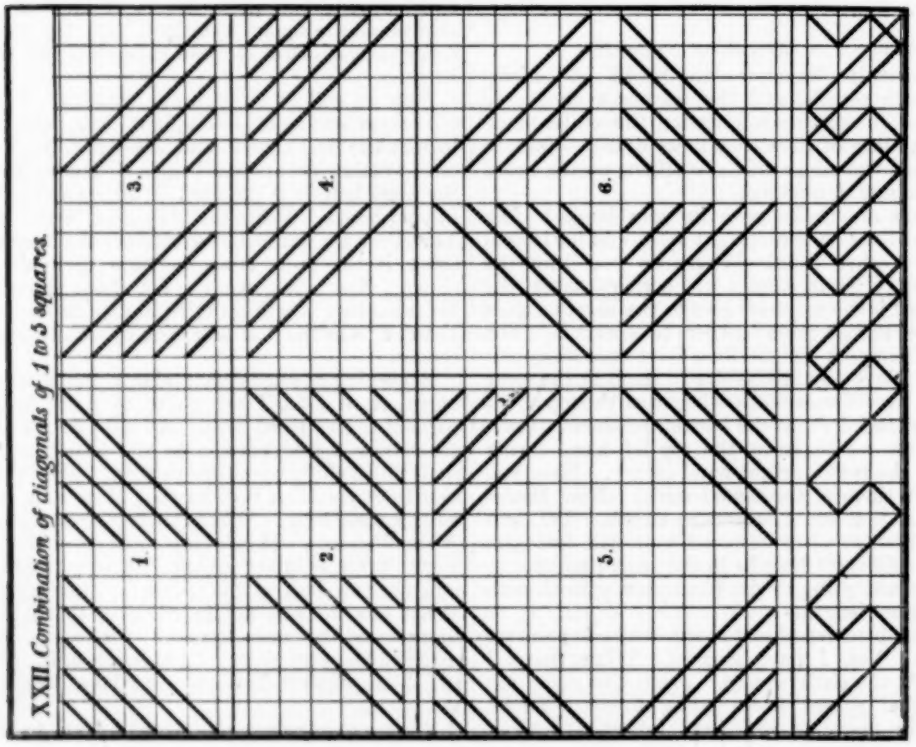
XXII. Combination of diagonals of 1 to 5 squares.
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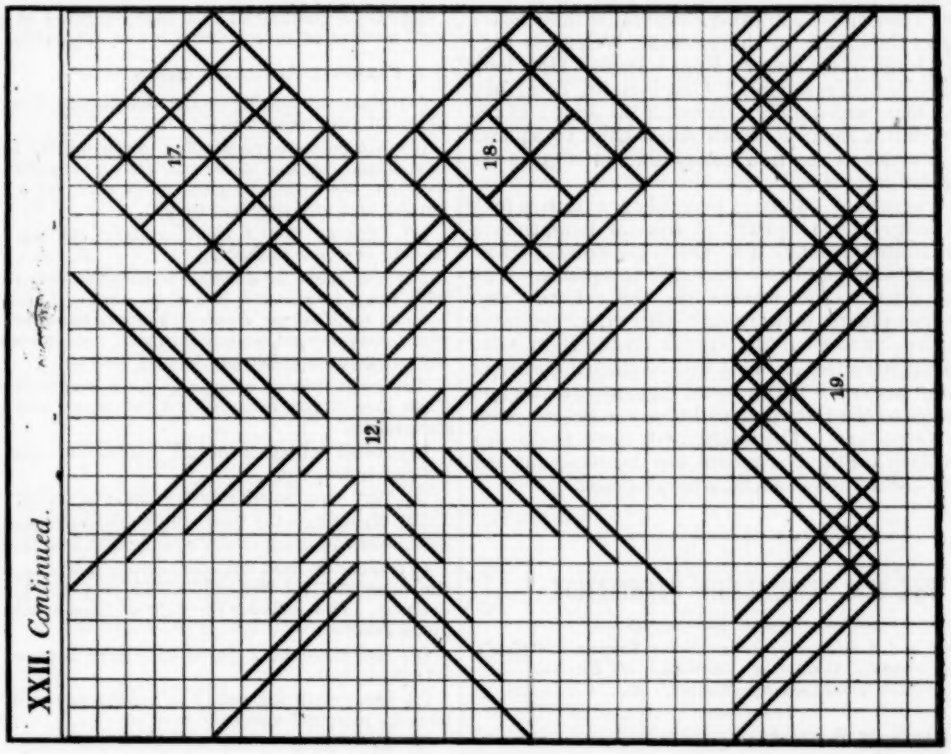
XXII. Continued.
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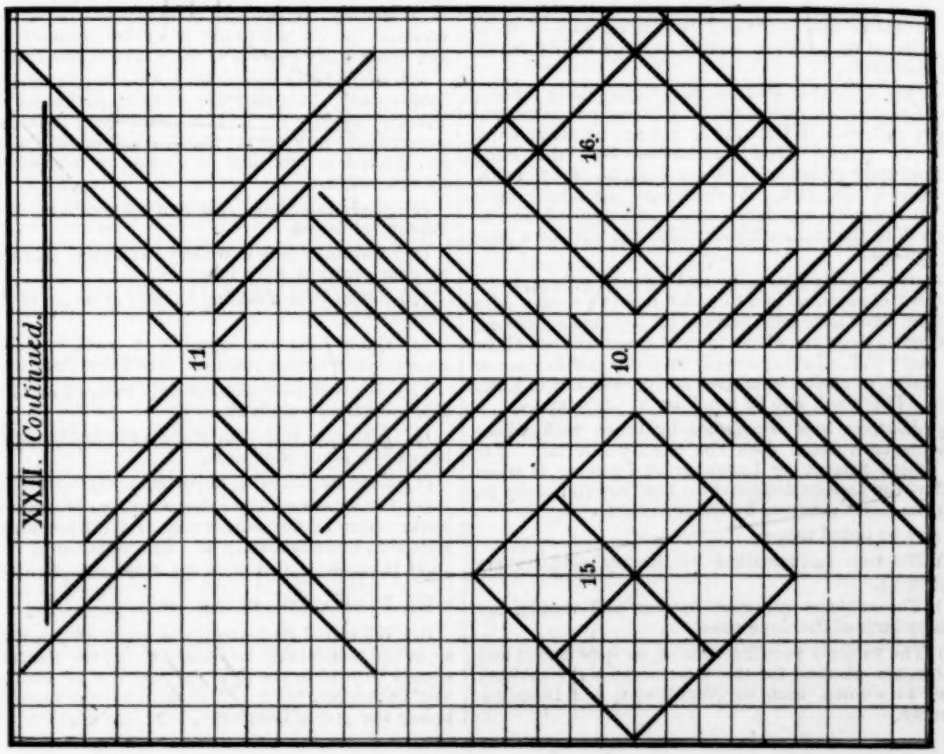
XXII. Continued.
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pattern. Where have I drawn them? In the middle of the centre square. What do the lines do to each other? They cross each other. Where do they cross? Exactly in the middle of the pattern. What do they make with the other lines? Four squares. How long are the sides of these squares? That is right, Tom, they are one square and a piece. What is the length of the piece? Half a square. Each side is thus 1½ squares long. Now let us see how many different figures we have in our pattern.

First a square of 5 squares long, then a square of 3 squares long, then 4 squares 1½ squares long, then 4 squares 1 square long, and then 4 oblongs. How many squares altogether? There are 10 squares. You may now draw another pattern like this. I want you to leave two squares between each pattern, so you must count two squares from the corner on the right side. Put a little mark there. This will be the left corner of the second pattern. If you count five squares up and five squares to the right that will give you the top point of the new pattern. The teacher will have to do this very carefully on the blackboard for the class, and see that each child knows exactly where to start.

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THE 1893 SCHOLARSHIP EXAMINATION.

BY DR. GEORGE BEACH, M.A.,

Co-Author of 'A Manual of our Mother Tongue,' 'A Girl's Arithmetic,' Author of 'Elements of English, 'Entertaining Readers,' etc.

I. Remarks on Routines.—

(*a*) All study to be successful must be systematic Method is of quite as much value as extra work, and the best methods can only be learned by experience. The appended Routine is the result of principles learned and applied during twenty years of extensive and successful 'coaching,' and, if it be properly adhered to, pupils of merely average ability can be sure of a good pass.

(*b*) *The time devoted to study* is three hours daily. Some of our contemporaries recommend 2½ hours per diem, but significantly add, that if Drawing or Science be taken, extra time must be given. Now considering that the Pupil Teacher's ordinary school work is not easy, he is set in this, his final year, a hard task. Nevertheless, the labour must be taken up manfully, self-denial must be exercised, and he that endureth to the end shall enter into the joys of a good Training College.

But to give a little elasticity and leisure only a lunar month's work is required in a calendar month's time. Also five hours per week have been allowed for Language, Science, and Drawing—a duration which in most cases will not all be required, many P.T.'s having already secured their Science or Drawing marks, or made themselves fairly proficient in Latin or French. There will also be a holiday at Christmas.

(*c*) *The Routines may be adapted* by those with whose arrangements each detail does not exactly dovetail. For instance, where Science or Language or Drawing is taken on Saturday, the lessons displaced for that day can easily be conned in the times deserted by the intruders.

It will also be noted that—

(1) No two mathematical or literary subjects are consecutive.

(2) The subjects common to men and women are taken by both at the same time.

(3) The subjects peculiar to men, such as Euclid and Algebra, are planned for the same time as the subjects proper to women, such as Needlework and Domestic Economy.

(*d*) Later on more time will be devoted to *Revision* and *Examination*.

(*e*) It is guaranteed that every portion of the syllabus shall be covered several times before July, 1893.

2. Personal Advice to Candidates.—

(*a*) Make the passing of the Scholarship Examination the object of your existence.

(*b*) Not only study according to routine, but *live* according to routine. Be able to say that (D.V.) 'at a given period on a certain day I shall be engaged in studying a pre-arranged portion of a fore-specified subject.'

(*c*) Take an hour's exercise daily and an hour's light reading or music practice.

Suppose there be devoted to *sleep* 10 hours (many can do with less), to *school* 6 hours, to *study* 3 hours, to *exercise* 1 hour, to *Music or Reading* 1 hour, there yet remain for meals, conversation, private business, unavoidable delay, etc., the not inconsiderable period of 3 hours.

The great fault in everybody's life is unutilised moments. Take care of the minutes and the hours will take care of themselves.

(*d*) Avoid excesses of all kinds — of food, diversion, pedestrianism, etc.

(*e*) Vary your posture during hours of study.

(*f*) Never face the light whilst reading or writing. Many headaches and much ocular weakness will be thus avoided.

(*g*) Work at least one hour before morning school, leave the noon interval free, and study two hours more in the evening. This includes the hour's lesson at school with the Head Teacher.

(*h*) Let there be a perod of leisure between study and retiring to rest.

(*i*) Study with ink-pencil in hand, ready to underline and to make marginal notes.

(*j*) Keep Note Books, but do not use them more than is necessary.

(*k*) Don't 'put up with' inferior Text Books. Get the best and stick to them. Dipping first into one book, and then into another, is (except for purposes of reference) most unwise. In the multitude of similar manuals is confusion, and much study thereof is weariness to the flesh.

We would again recommend Professor Darqué's 'La Jeune Sibérienne'. This, together with the Article on 'Scholarship French' by Mr. W. T. Thompson, B.A., should ensure very good results in French. Suitable editions of Cæsar are either Dr. Schmidt's, published by Collins, or Walpole's, published by Macmillan.

(*l*) Study the Model Answers contained in our August and September issues.

(*m*) Carefully note down any 'wrinkles' that are suggested by your practical work in school.

(*n*) Select your Training College or centre of Examination *at once*.

(*o*) Don't defer the learning of your repetition, but in accordance with our routines, take a few lines weekly.

(*p*) See that your name is duly entered in 'Form IX' as a Scholarship Candidate.

(*q*) Take care that your name is notified to the Department before the 1st of May next.

(*r*) Keep *au fait* with important contemporaneous events.

(*s*) Don't take up any private tuition or other extraneous work. Give up any offices such as a cricket club secretaryship, etc., or membership of a Dorcas Society.

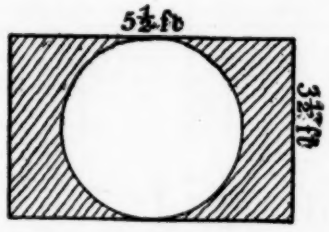
(*t*) Become familiar with the schedules of the Code.

III. Errata, etc., in last issue.

(*a*) We stated that no student under 18 years of age might sit at the Scholarship Examination. This remark, however, should be read in the light that the age is calculated up to 31st December, 1893. All candidates, therefore, born on or before the 31st of December, 1875, are eligible.

(*b*) *Question 11. Mensuration p. 149, second column.*

The frame of a circular mirror is $5\frac{1}{2}$ feet long and $3\frac{1}{2}$ feet broad. Find the radius of the mirror when its area is equal to that of the frame.



Frame has to be *assumed* rectangular

Area of frame and mirror $= \frac{11}{4}$ feet $\times \frac{7}{4}$ feet $= \frac{77}{8}$ sq. ft.

But area of mirror $= \frac{1}{2}$ area of frame and mirror $= \frac{77}{16}$ sq. ft.

" " " $= \pi r^2 = \frac{22}{7} r^2$.

$\therefore \quad \frac{22}{7} r^2 = \frac{77}{16}$ sq ft.

$\therefore \quad r^2 = \frac{77}{16} \times \frac{7}{22}$ sq. ft. $= \frac{49}{32}$ sq. ft.

$\therefore \quad r = \frac{7}{4}$ ft. $= 1\frac{3}{4}$ ft.

This question is wretchedly propounded, for (1) the shape of the frame is not given, and (2) if we assume it to be rectangular, then we get the *diameter* of the mirror $3\frac{1}{2}$ feet, and at two points there is no breadth to the frame at all!

The Department has been approached upon this point, and, we believe, has ordered 'allowance to be made.'

(*c*) *Question 10. Mensuration p. 149, last line of first column.*

Read $\frac{4296600}{100000}$ acres $=$ 42·966 acres. Ans.

(*d*) *Arithmetic* (7*a*) *p. 144, first column.*

Read in second line of working $(\frac{3}{4} - \frac{1}{2}) \div (\frac{3}{4} + \frac{3}{5})$. Ans. $\frac{5}{27}$

(*e*) *Arithmetic Question* (2), *p. 144, first column.*

Read in third line of working $\frac{132562560}{304629} = 435\frac{48846}{304629}$.

$\therefore$ 435 = Ans. (being nearest integer).

IV. Domestic Economy will require from the ladies special attention as it is far too frequently neglected throughout the first three years of apprenticeship.

In addition, the Department formulates no syllabus, and the kind of information to be acquired has to be learnt from a study of questions already set.

At the last Scholarship Examination the custom of the last twenty years again obtained, and fourteen queries were propounded (*see our last issue*) under five sectional heads. Only one question in each section, or five in all, were allowed to be answered.

The following are the favourite points which recur year after year. Those most frequently touched upon are italicised.

Section I.—Needlework, etc. (two questions given).

Definition of 'plain' needlework, description of the different *patches*, gathering, *darning*, purling, whipping, and setting on frill, hemming, frilling, back-stitching, feather-stitching; description of the stitches required for *woman's night dress, flannel shirt, calico shirt, pinafore*, and any article of underclothing; directions for sewing on a string, a button, and for mending a tablecloth, *a flannel petticoat*, and the *heel of a stocking*; description of principal articles of clothing made by hand-knitting; rules for knitting a whole stocking, *the toe*, knitting with two needles; production and use of calico, flannel, linen; utilisation of old clothing and old household linen; cutting out of *pinafore*, baby's frock, man's shirt, boy's shirt; *Code requirements* in needlework for Standards III., IV., and Scholarship Candidates; limits of the use of a sewing machine; *outfits for Schoolmistress, Training College Students, Pupil Teacher, and for girl servants of various ages going out in divers capacities.*

Section II.—Savings and Investments (three questions given).

The best forms of thrift for children, teachers, and parents; *details of town, sub-urban, and rural teachers' expenditure;* reasons for difference of rural and urban salaries; *apportionment of teachers' tradesmen's, artizans', labourers' incomes;* expenditure on furnishing; details of economy and frugality; *proportion of savings to income; investments of a mistress' savings; Post-office facilities for saving; annuities;* safe investments; benefit clubs, clothing clubs, building societies, co-operative societies, insurance companies, government stock.

(*To be continued.*)

V. We cannot resist calling our Readers' attention to a new 'Elementary Physiography,' *just* published. The price is only 2s. *nett*, the diagrams are excellently got up and multitudinous, the type is clear and varied, the matter well selected, lucidly set forth, and methodically arranged, and the qualifications of the author, Mr. R. A. Gregory, F.R.A.S., are too numerous to mention. A cheaper florin's worth is not attainable.

(*For Correspondence, see end of Certificate Article.*)

SELECTED SCHOLARSHIP QUESTIONS.

Week ended 8th October, 1892.

1. Paraphrase

'In misery's darkest cavern known
His useful care was ever nigh,
Where hopeless anguish poured his groan,
And lonely want retired to die.

'His virtues walked their narrow round,
Nor made a pause nor left a void;
And sure the Eternal Master found
The single talent well employed.'

2. Select and classify the pronouns, conjunctions, and prepositions in the above sentence.

3. Draw a map of the mountain and river system of the United States.

4. Enumerate the chief productions of Trinidad, Victoria, and Ceylon. Give the dates of the acquisition of these possessions.

5. What is the great watershed of North America? Name the chief rivers, whose courses it separates, and draw a sketch-map of any one of them.

6. Name the sovereigns of the House of Brunswick, with the dates of their accession. Trace their descent from the last reigning dynasty, and state on what their right to the throne is founded.

7. Trace, by genealogical tables, the double descent of Henry IV. from Henry III., and the descent of Henry III. from the Saxon line.

8. Write Notes of a Lesson on '*The Commercial Importance of the Rhine, Vistula, and Danube.*

9. Mention any difficulties you may have met with in the effort to control the children whom you have had to teach, and state how these difficulties were overcome.

10. Write the signatures of the following *minor* keys:—F, B, E, G, B♭, F♯, OR

Write in figures very distinctly over each note and rest in the following passage its value in pulses or fractions of a pulse:—

| n : — . f . r | n . r : n | s, d . r : n, n | . f, r : d. ‖

11. Out of a cistern $\frac{3}{4}$ full, 20 gallons are drawn, 70 gallons are then added and it is found to be $\frac{5}{6}$ full. How much does it hold?

Ans. 300 gals.

12. A grocer bought butter at 1s. 1½d. per lb., and sold it at 1s. 4½d. per lb. Express his profit as a decimal of the cost price.

Ans. ·2.

13. A man increased his capital annually $\frac{1}{7}$ part, and at the end of 4 years, one year's interest at 4½ per cent. amounted to £135. What capital did he start with? Ans. £949 4s. 4½d.

14. (*Men only.*) Work out Euclid I. 11.

If P be any point within an equilateral triangle ABC, show that a triangle can be constructed having its sides respectively equal to PA, PB, PC.

(*Women only.*) Make up, in calico, the sleeve (full-size) of an infant's night-gown.

SCHOLARSHIP OR FOURTH YEAR ROUTINE FOR **OCTOBER**, 1892. (MEN AND WOMEN.)

DAYS	FIRST WEEK.			SECOND WEEK.			THIRD WEEK.			FOURTH WEEK.		
	I.	II.	III.	I.	II.	III.	I.	II.	III.	I.	II.	III.
MONDAY	Introduction to Algebra — Questions on Needlework	History from 1685 to 1702	Latin, *or* French Grammar	Multiplication of Algebra — Ingredients of Food	Dates from 1688 to 1714	Latin, *or* French Grammar	Division of Algebra — Rules of Health	History from 1714 to 1727	Latin, *or* French Grammar	Algebraic Factors — Miscellaneous Arithmetic	Dates from 1714 to 1760	Latin, *or* French Grammar
TUESDAY	Props. 1 and 2 of Euclid, Book II. — Calico Sampler	General Geography of North America	Science, *or* Revision	Props. 3, 4, and 5 of Euclid, Book II. — Diagram of Chemise	Revise Geography of England	Science, *or* Revision	Props. 6 and 7 of Euclid, Book II. — Flannel Sampler	Political Geography of the United States	Science, *or* Revision	Props. 9, 10, and 11 of Euclid, Book II. — Calico Sampler	Political Geography of British North America	Science, *or* Revision
WEDNESDAY	Cube Root Square Root	History of English Language, The Anglo-Saxon Period	Drawing, *or* Revision	Cube Root — Present Worth and Discount	Paraphrasing and Dictation	Drawing *or* Revision	Cube Root — Stocks	Tables of English Literature — Poets	Drawing, *or* Revision	Averages	Greek Roots	Drawing, *or* Revision
THURSDAY	Addition and Subtraction of Algebra — Savings and Investments	History from 1702 to 1714	Pages 4 to 9 of La Jeune Sibérienne, *or* Chapters 1 to 3 of De Bello Gallico	Multiplication of Algebra — Preparation of Food	England under the Romans	Pages 9 to 14 of La Jeune Sibérienne, *or* Chapters 3 to 8 of De Bello Gallico	Division of Algebra — Clothing and Washing	History from 1727 to 1760	Pages 14 to 19 of La Jeune Sibérienne, *or* Chapters 8 to 12 of De Bello Gallico	Algebraic Factors — Miscellaneous Arithmetic	Saxon England	Pages 19 to 24 of La Jeune Sibérienne, *or* Chapters 12 to 17 of De Bello Gallico
FRIDAY	Revise first 16 Propositions of Euclid, Book I. — Flannel Sampler	General Geography of North America	Science, *or* Revision	Deductions on Euclid, Book I. — Calico Sampler	Map of United States	Science, *or* Revision	Revise Props. 16 to 32 of Euclid, Book I. — Diagram of Chemise	Political Geography of the United States	Science, *or* Revision	Deductions on Euclid, Book I. — Flannel Sampler	Map of United States	Science, *or* Revision
SATURDAY	Metric System	Parsing and Analysis	How to teach Mental Arithmetic	Repetition and Literature	Metric System	Study Table of English Literature	Rewards and Punishments	Music	Present Worth and Discount	Parsing and Analysis	Physical Exercises at School	Any Revision	Mensuration of the Circle — Clock Sums	Paraphrasing and Penmanship	Any Geography	Repetition and Literature

15. (*Men only.*) Write out Euclid II. 3.

Any rectangle is half the rectangle contained by the diagonals of the squares on its adjacent sides.

(*Women only.*) Give the materials, with quantities, for a plum pudding for a family of six.

16. (*Men only.*) Find the acreage of a triangular field whose sides are 2,170, 4,040, and 4,950 links. Ans. $355\frac{1}{11}$ acres.

(*Women only.*) Describe the best forms of thrift (*a*) to be recommended in lessons to school children, and (*b*) to be adopted by the teacher herself. Give reasons for your answer.

17. (*Men only.*) Show that the product of any four consecutive numbers increased by 1 is a perfect square. Ans. $(x^2 + 3x + 1)^2$.

18. (*Men only.*) If p, q, be the roots of the equation $x^2 - ax + b = 0$, show that $p + q = a$, and $pq = b$.

WEEK ENDED 15th OCTOBER, 1892.

1. Write a brief essay upon '*Rome was not built in a day.*'

2. Explain the terms *cardinal*, *ordinal*, and *indefinite* numerals, and give examples of each.

3. Give a summary of what you know about London under these heads :—(*a*) *position*, (*b*) *approximate area and population*, (*c*) *supply of food and fuel*, (*d*) *commercial and financial importance*, (*e*) *access to seaside watering-places*.

4. State in tabular form the chief statistics respecting the Solar System.

5. Mention the chief warriors, statesmen, and writers who flourished in the reign of Elizabeth, and give a particular account of one of them.

6. What was the claim of Edward III. to the crown of France? Give the chief events of the war caused by that claim from 1340 to 1360.

7. Into how many classes was your school divided? What classes did you principally teach? What were the subjects and the order in which they were taken? Give an example of one week's work of your school.

8. In giving a lesson on '*The Duke of Wellington*,' show what use you would make of comparison and contrast with any other character in history.

9. Explain briefly the following terms :—*Pianissimo*, *Staccato*, *Mezzo Piano*, *Forte*, *Rallentando*, *Dolce*.

10. Express, in fractions, the relation of 7 miles 4 furlongs 30 poles to 9 miles, 1 furlong 25 poles 2 yards 1 foot 6 inches.

Ans. $\frac{3}{4}\frac{3}{0}$ and ·825.

11. Prove the rule for division when the divisor is a number larger than twelve (*e.g.* 36,924 ÷ 79).

Ans. 4 hunds. 6 tens $7\frac{3}{7}\frac{3}{9}$ units.

12. A farmer paid £780 for cows and sheep. Of this sum he paid £350 for 25 cows. If a cow cost 7 times as much as a sheep, how many sheep did he buy with the rest of the money?

Ans. 215 sheep.

13. (*Men only.*) Write out Euclid I. 15.

ABCDE is an equilateral and equiangular pentagon. AC, AD are joined; prove that each of the angles ACD, ADC is double the angle CAD.

(*Women only.*) Mark in cross-stitch the letters V.R.

14. (*Men only.*) Write out Euclid II. 4.

If two equal straight lines intersect each other anywhere at right angles, the quadrilateral formed by joining their extremities is equal to half the square on either line.

(*Women only.*) Why do persons who lead a sedentary life require less food than they who work in the open air?

15. (*Men only.*) The frame of a circular mirror is $5\frac{1}{2}$ feet long and $3\frac{1}{2}$ feet broad. Find the radius of the mirror when its area is equal to that of the frame.

Ans. $1\frac{3}{4}$ feet.

(*Women only.*) Describe the order and method of carrying out a weekly washing in a poor man's house.

16. (*Men only.*) Solve the equations—

(*a*) $\left.\begin{aligned} 4y + \frac{65}{x} + 23 &= 0 \\ 3y - \frac{78}{5x} + 22\frac{1}{2} &= 0 \end{aligned}\right\}$ Ans. $x = 13$, $y = -7$

(*b*) $\frac{2x-3}{3x-2} + \frac{2}{3} = \frac{3x-2}{2x-5}$. Ans. $x = -\frac{53}{3}$ or 1.

17. (*Men only.*) A tradesman started in business with a capital of £1,200, and in the first year he makes a certain percentage of profits, from which he takes £164 and adds the rest to his capital. In the next year he makes the same percentage of profits, and having withdrawn £1,164, finds that he still has £1,422 left in the business. What percentage of profits did he make?

Ans. 22 per cent.

WEEK ENDING 22ND OCTOBER, 1892.

1. Define a preposition and show by examples that prepositions do not always precede the governed noun.

Analyse the following lines and parse the words in italics—

'*Tis* morn, but *scarce yon* level sun
Can pierce the war *clouds* rolling *dun*
Where furious Frank and fiery Hun
Shout in their sulphurous canopy.

Few, few shall part where *many* meet
The snow *shall be* their winding *sheet*.
And every turf beneath their feet
Shall be a *soldier's* sepulchre.

3. Draw a map of the Eastern Coast of the United States.

4. Give a summary of what you know about India under these heads: (*a*) *position*, (*b*) *approximate size*, (*c*) *climate* and especially *rainfall*, (*d*) *mountains*.

5. What do you know of the dwelling-houses, dress, amusements, and domestic habits of Englishmen in the time of the Tudors?

6. State when each of the '*following*' lived, and for what he was noted :—Chaucer, Sir Thomas Fairfax, Hereward, John Locke, Sir Charles Napier, Sir Isaac Newton, Lord Palmerston, Pope, Sir Joshua Reynolds.

7. Give some hints for making oral exercises in Arithmetic interesting.

8. What sort of decoration is most appropriate in a schoolroom, and most likely to make it bright and attractive to the scholars?

9. Give the Italian equivalents for *Increasing Pace*, *Very Loud*, *Lively*, *Majestically*, *At Pleasure*, and *Repeat from the beginning*.

10. Explain why the words '*borrowing*' and '*carrying*' are often misused in teaching subtraction, and show, by the help of an illustration, which is the best way of making the meaning of that rule intelligible to young children.

11. A man invests part of £2,445 in a 5 per cent. (*A*) Stock at 120, and the rest in another 5 per cent. (*B*) Stock at £125. His income from the two investments is £100 per annum. What sum did he invest in each Stock? (Neglect brokerage.)

Ans. £1,320; £1,125.

12. What do you mean by a prime number, a factor, a common measure, a common multiple, subtrahend and minuend?

13. (*Men only.*) Write out Euclid I. 19.

If two equal rectangles have one side equal to one side, the other sides are also equal.

(*Women only.*) Compare the relative advantages as regards salary to a Schoolmistress of (*a*) A country school with a teacher's house and £60 per year; and (*b*) A town school with no house and £90 per year.

14. (*Men only.*) Write out Euclid II. 5.

The squares on the diagonals of any quadrilateral are double the squares on the lines joining the middle points of the opposite sides.

(*Women only.*) What is the difference between linen and cotton? Say for what purposes and when either is to be preferred to the other.

15. (*Men only.*) A cottage which stands on a square plot of 729 feet contains four rooms of equal size on the ground floor, and is divided into two equal parts by a passage 4 feet wide, having two rooms on each side. Find the area of each of the four rooms, allowing one foot for the thickness of each wall. Ans. $113\frac{1}{4}$ ft.

(*Women only.*) Summarise the advice you would give to a young girl going into service as to to the choice of sensible, suitable and economical clothing.

16. (*Men only.*) There is a number consisting of two digits, the number is equal to three times the sum of its two digits, and if 45 be added to the number the digits interchange their places. Find the number. Ans. 27.

17. (*Men only.*) Two trains go from P to Q by different routes, one of which is 15 miles longer than the other. A train on the shorter route takes 6 hours, whilst a train on the longer route, travelling 10 miles less per hour, takes 8½ hours. Find the length of each route. Ans. 240 miles and 255 miles.

WEEK ENDED 29TH OCTOBER, 1892.

1. Analyse the following sentence, and parse the words in italics :—

'I *have been* for *some* time unsettled and *distracted : my* mind *is disturbed* with a *thousand* perplexities of doubt and *varieties* of imagination, *which hourly prevail* upon me, *because* I have no opportunity of relaxation *or* diversion.'

2. Paraphrase the above passage.

3. Draw an outline map, with lines of latitude and longitude, of '*The English Channel.*'

4. Write 'Notes of a Lesson' on any mountain range or river in South America.

5. What is meant by the '*Revival of Learning?*' When did it take place, and to what causes is it to be attributed? Mention some of the leaders in the movement in England and elsewhere.

6. What events led to the battle of Waterloo? Describe it.

7. Describe the best method of proceeding in teaching a new song to infants or to older children.

8. Say what is the use to a pupil teacher of keeping a diary of employments, or notes of the lessons he or she gives. If you have been accustomed to preserve such a record, describe it.

9. State what minor keys are shown by the following signatures : —5 flats, 4 flats, 2 flats, 5 sharps, 3 sharps, and 1 sharp ; OR Rearrange the following in order of pitch, placing the highest note first :—

t r' d n fe s l d' t, l r fe s,

10. Demonstrate that whenever four numbers are in proportion the product of the first and fourth terms *must* be equal to the product of the second and third.

11. Find the exact difference between the Simple and Compound Interest of £6,072 for three years at 3½ per cent. per annum.
Ans. £22 11s. 5·98488d.

12. How many gallons of wine at 11s. 2d. per gallon must be mixed with 533 gallons at 15s. per gallon to gain 20 per cent. when the mixture is sold at 17s. 6d. per gallon? Ans. 65 gallons.

13. (*Men only.*) Write out Euclid I. 22.

Write out the postulates, and define a circle and parallel straight lines.

(*Women only.*) Describe fully the different stages of instruction by which a child would advance from her first lesson in knitting to making a stocking for a full-grown man.

14. (*Men only.*) Write out Euclid II. 6.

When the perimeter of a parallelogram is given, its area is a maximum when it is a square.

(*Women only.*) Describe the principal articles of clothing made by hand-knitting, and show by your statements that instruction in the subject is of value to children in their school and home life.

15. (*Men only.*) Show that the area of a triangle whose sides are in the ratio 3 : 3 : 4 is greater than $\frac{4}{9}$ of the area of a square described on one of the shorter sides.

(*Women only.*) What rate of interest is allowed by the Post Office Savings Bank? Compute the sum which, including interest, would be saved in three years by a person who regularly placed two shillings per week therein. Ans. £16 3s. approximately.

16. (*Men only.*) Solve $\frac{6}{x} + \frac{x}{6} = \frac{5(x-1)}{4}$.

Ans. $x = 3$, and $-\frac{24}{13}$.

17. (*Men only.*) Show that the L.C.M. of any two expressions is found by dividing one of the expressions by their H.C.F., and multiplying the quotient by the other expression.

SCIENCE NOTES.

ALUMINIUM IN THE ARTS.—Attention has been drawn in these columns to the drawbacks connected with aluminium, which is now much used in the domestic arts. Züttert and Roscher assert not only that it is attacked by tea and coffee, acetic, boric, carbolic, citric, and tartaric acids, Bordeaux and Moselle wines and soda, but also that the metal is to some extent dissolved by the action of boiling water. On the other hand, a French scientist, M. Balland, as the result of a series of experiments instituted with the view of determining whether aluminium is a suitable material for the manufacture of domestic utensils, declares that air, water, wine, beer, cider, coffee, milk, oil, butter, and dripping have less effect on aluminium than on any other metal in ordinary use. Vinegar and sea-salt, he admits, attack it, but not, he thinks, to such an extent as to render its employment undesirable.

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A NEW BACILLUS.—In a communication to the Chemical Society of Paris, Dr. A. B. Griffiths gives an interesting account of a new bacillus, which has received the name of *Bacillus pluviatilis* from the circumstance of its development in rain-water, preserved during a mild winter in a barrel exposed to the air. The plate cultures it forms are of a brilliant yellow tint. Upon potato the culture, which assumes an orange hue, slowly converts the starch into glucose. The colouring matter produced is soluble in alcohol, ether, chloroform, benzine, and carbon disulphide, but is insoluble in water. The microbes, which vary in length and width, do not form spores, are easily stained by aniline colours, and are incapable of living in water which is free from organic matter. When exposed to a temperature of 100 degrees Centigrade, they are killed in twenty minutes.

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THE STERILIZATION OF MILK.—In the recent report made by them to the Dairy Commission of the State of New Jersey, Dr. Albert Leeds and Professor Conn question the advantages of sterilized milk as a hygienic food for infants. While admitting that it is of great importance that the milk given to infants should be free from bacteria, they point out that sterilization by heat, under pressure, of a temperature above 100 Centigrade certainly so changes the character of the milk that it can no longer be regarded as the same product that was furnished by Nature. Several species of the pathogenic bacteria, *e.g.*, cholera germs, are destroyed by the germicidal power of fresh milk, a power instantly destroyed by the rapid heating of the milk in the process of sterilization. Again, the soluble albumin of raw milk becomes in part coagulated under the influence of heat, and is thereby rendered insoluble and more difficult of digestion. Galactozymose, the starch-liquefying ferment of raw milk, is entirely destroyed by a temperature of 75 Centigrade ; and this is a matter of special importance, because the saliva of infants does not, like that of adults, possess a ferment capable of converting starch into sugar. Moreover, long-continued heating destroys the milk sugar ; the fat of milk existing in the form of an emulsion, a state necessary for its absorption from the intestines, is liberated, rendering the digestion of the milk more difficult ; and the casein becomes less easily and less completely precipitated by rennet. Under these circumstances, Dr. Leeds and Professor Conn assert that the advocates of sterilized milk must prove that the resultant artificial food is a desirable one for infants.

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THE SCENT OF FLOWERS.—The *Acti Horti Petropolitani* contains an interesting account by Regel of some observations recently made at St. Petersburg on the relation of the scent of flowers to their external conditions. The odours of plants, which like the sweet pea and mignonette, diffuse their scent during the day seem much more intense in warm than in cold dull weather. While some already opened specimens of *Philadelphus coronarius* and *Reseda odorata*, which contain ethereal oil, were found to smell strongly in the dark and to retain their odour till they withered, buds entirely developed in the dark gave different results. Some plants of *Reseda odorata* and *Matthiola incana*, possesssing perfectly odourless buds, were placed in a dark room, and others in which the inflorescences were only protected from the light were grown for comparison with them in a light room. It was then found that whilst the flowers in the last mentioned case opened and diffused their perfume, though in less quantities than under normal conditions, those developed in the dark had no scent, except when the buds were well advanced at the beginning of the experiment ; and no trace of ethereal oil was discernible in sections taken of their leaves. The nutrient matter, at the expense of which the ethereal oil is produced in the dark, would seem therefore only to be formed in the light. Flowers of *Nicotiana*

longiflora smell more at night than they do in the day, and most intensely after a hot sunny day, but when kept in the dark they smell alike in the day and at night. When *Nycterinia capensis*, a plant which exhales its odour only at night, is kept entirely in the dark, its flowers gradually lose their scent after the first day, and coincidently with the disappearance of the perfume occurs the complete consumption of the starch in the cells of the floral leaves. Odourless blossoms, steeped in a sugar solution, as starch formed in their leaves, regained their scent, and lost it again on the disappearance of the starch which followed their transference to distilled water. The flowers of *Platanthera bifolia*, when grown in open spaces, have more scent than when sheltered in woods.

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THE ACTION OF CARBONIC ACID WATERS ON MICROBES.—In Italy, Dr. A. Montefusco has lately been engaged in the investigation of manufactured carbonic acid waters with the object of ascertaining the action of the gas on pathogenic microbes. He comes to the conclusion that its effect on the micro-organisms of anthrax, cholera, and typhus fever are *nil*, though it destroys the saprophytic bacteria of drinking water. Though artificial Seltzer water sometimes contains the microbe *Micrococcus candicans*, but no other form, it does not propagate itself in the water. One sample examined by Dr. Montefusco contained at first ten bacteria per cent., but in the course of twenty days the number was reduced to four or five, and in another sample they had disappeared altogether. Carbonic acid waters have therefore hygienic value.

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BEET SUGAR IN SPAIN.—The Spanish Government is making great efforts to develop the manufacture of beet sugar in that country, In Aragon, the *Comité d'Initiative* has just granted to all agriculturists engaged in the cultivation of the sugar beet in 1893 an advance of a hundred francs, together with the manures required for cultivation. Beetroot sugar sells in France at the rate of 40 fr. the 100 kilogrammes, and a recent law places at the disposal of the Minister of Agriculture 270,000 francs. to found a school at Douai where the art and science of sugar refinery are to be taught.

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THE FEEDING OF INSECTIVOROUS PLANTS.—It is claimed as the result of experiment that though insectivorous plants are provided with various agencies for the capture and absorption of insects, the supply of food thus furnished to the plant is not so good as a proper artificial supply, and that carnivorous plants that in their homes are allowed to indulge their fly-catching propensities are less luxuriant and live a shorter time than the same species fed through the roots in this country. It should be noted, however, in this connection, that these plants in their native habitats grow in very poor soil, and make feeble roots, while under cultivation fairly good sized roots are developed. Mr. A. J. Manda asserts in a paper recently read before the Royal Horticultural Society that the well-known plant, Venus's Fly-trap (*Dionæa muscipula*), *Cephalotus follicularis*, a native of King George's Sound, and the *Sarracenias* are grown in the greatest perfection by feeding them in the ordinary way through the roots, insects being entirely excluded by means of a bell-glass.

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A NEW USE FOR CARRIER PIGEONS.—M. Stroebel, who, in spite of his German name, is an officer in a French line regiment, suggests a new employment for carrier-pigeons, that of vaccine transmission in time of war. Already, through the agency of these birds, he has successfully sent supplies of vaccine from one place to another some distance off. The quill affixed to the median feather of the bird's tail, instead of the despatches that are generally sent in this way, is filled with minute tubes containing vaccine, that are well secured by bits of matches.

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VEGETABLE OILS AND SPONTANEOUS COMBUSTION.—Dr. Kedzie, Professor of Chemistry in the Michigan State Agricultural College, draws attention to the fact that the mineral oils are much less liable to what is popularly known as spontaneous combustion than vegetable oils. Vegetable oils, and especially spirits of turpentine, tend to take oxygen rapidly from the air, and thus generate heat. The large extent of surface exposed to the air promotes this oxidation, and rags, being poor conductors of heat, retain the heat produced by oxidation. Hence the danger of spontaneous combustion, a danger increased by the rags being moist. Similar instances of spontaneous combustion are seen in hay-mows, when the hay has been put up damp. The danger from spontaneous combustion is increased where a quantity of greased rags are left in a pile so loosely placed as to allow a free access of air, yet so compact as to keep in the heat caused by oxidation. Vegetable oils, such as linseed and cotton-seed oil, and especially spirits of turpentine used in making varnish, are indeed highly inflammable. Where a painter rubbed the paint from his hands with the sawdust in a box, within a quarter of an hour the oil of this paint, thus spread over a large surface of sawdust, was smoking, and burst into flames when thrown out into the road.

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THE HOFFMANN HOUSE.—The German Chemical Society has determined to perpetuate the memory of its late President, Professor Hoffmann, by the erection of a house to be called after him, which may serve as the home of various scientific societies and a centre for the holding of scientific congresses, demonstrations, and exhibitions. A laboratory for chemical investigations is to be equipped there, which shall be quite distinct from any of those specially attached to the universities.

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NOTES ON ADVANCED PHYSIOGRAPHY.

BY R. A. GREGORY, F.R.A.S.

Honours Medallist in Physiography, Author of 'Physical and Astronomical Geography' and 'Elementary Physiography.'

THESE notes are designed for students who intend presenting themselves for examination in Advanced or Honours Physiography in May, 1893. They must be regarded more as summaries than descriptions of natural phenomena and laws. More detailed information must be obtained either by attending lectures or classes, or by reading selected portions from text-books which will be referred to from time to time. It is almost impossible for students to pass in the Advanced Stage of Physiography unless a thorough grounding in the elementary part of the subject has been obtained. Indeed, so far as the physical geology is concerned, all that is required is a deeper knowledge of the subjects included in the elementary course. In addition to this, the syllabus of the advanced course includes a wide array of astronomical topics. To obtain a proper understanding of astronomy, it is necessary at least to see, or better to handle, the instruments of observation. The student whose knowledge of the spectroscope relies simply upon what he has read about it will be sure to find himself at fault in the end. The principles of construction of such instruments, and the chief results of observation, will be touched upon in these notes. The practical acquaintance with the instruments, which alone is capable of driving facts home, must be obtained in class or by visiting a collection of science apparatus such as that on view in the Western Galleries of the South Kensington Museum.

Students are recommended to obtain the following text-book to read in connection with these notes:—'Elementary Lessons in Astronomy,' by J. Norman Lockyer. Price 5s. 6d. Published by Macmillan and Co. It will also be necessary to use for revision 'Elementary Physiography,' by R. A. Gregory. Price 2s. 6d. Published by Joseph Hughes and Co.

At the end of each lesson, all the questions bearing on the subject which have been set for Advanced Physiography since 1877 will be given. Answers to these should be written out by the student without assistance from books, for there is no better method than this for testing knowledge or showing up weak points.

GENERAL SURVEY OF THE SOLAR SYSTEM.

Major planets, minor planets. Inclination of the equatorial planes of the chief planets to the eclipic. Nodes. Satellites. Inclinations of orbits. Comets and meteors; pecularities of their orbits.—(*Extract from Syllabus of Advanced Physiography.*)

The matter to be read, in connection with the following notes, is indicated below:—

Lockyer. Introduction. Lesson X. to XV., or Young, Chapter IV. (omitting §§ 105, 112-114, 125-130); Chapter VIII. up to § 231. For revision, read Chapters IX. and X. in Elementary Physiography (Gregory.)

On a fine night the sky appears to be covered with numberless points of light called stars, which keep their relative positions unchanged, and move as if fixed to the inside of a solid revolving

globe. Besides these, there are objects which move among the stars and are known as *planets*. Various systems were suggested by the ancients to explain the complicated motions of these bodies, but the first which satisfied all the cases was developed by Copernicus.

The Main Principles of the Copernican Theory are :—

(1) The daily motion of the heavens from east to west is only an apparent motion caused by a rotation of the earth from west to east on an axis passing through its centre.

(2) The earth is one of a family of planets which revolve round the sun and depend upon him for their light and heat.

Proofs of the Earth's Rotation.

(1) A stone dropped from the top of a high tower falls slightly to the east of the base (Newton's experiment).

(2) If a long pendulum is set vibrating, the plane of vibration is twisted round in the same direction as watch-hands in the northern hemisphere, and in the opposite direction in the southern hemisphere (Foucault's pendulum).

(3) A well-balanced wheel, if set in rapid rotation in a vertical plane, has its plane of rotation twisted round in the opposite direction to watch-hands in the northern hemisphere, and in the same direction as watch-hands in the southern hemisphere (Foucault's gyroscope).

Consequences of the Earth's Rotation.

(1) A shot fired from a gun in the direction of higher latitudes is deviated towards the east ; but if the gun is fired in the direction of lower latitudes, the shot is deviated towards the west.

(2) The Direction of Winds and Ocean Currents :—Winds and ocean currents moving from the equator are deviated towards the east ; those moving to the equator are deviated towards the west.

(3) The bulging of the earth at the equator and flattening at the poles ; for this is the form which would be assumed by the rotation of a semi-fluid mass.

Proofs of the Earth's Revolution Round the Sun.

(1) The Annual Aberration of fixed stars. Owing to the motion of the earth in its orbit, combined with the velocity of light, all the stars seem to be displaced towards that point of the heavens in which the direction of the earth's motion tends at the moment. The amount of displacement, 20″5, is the *constant of aberration*. Stars on the plane of the earth's orbit (the plane of the ecliptic) oscillate from 20″ 5 on one side of their mean position to 20″ 5 on the other side in a year ; other stars describe ellipses in the course of a year, the major axes of all of which are 41″ long, and the minor axes of which increase with the height above the ecliptic plane, and become equal to the major axes at the poles of the ecliptic.

(2) The Annual Parallax of Fixed Stars. Although the stars are at enormons distances from the earth some of them appear in a slightly different direction when observed at different times in the year. This variation would be impossible if the earth were at rest.

(3) By observations with the spectroscope (to be described hereafter) it has been directly proved that the earth revolves in an orbit, moving towards one part of the heavens at one time and in an opposite direction six months later.

(4) It can be proved mathematically that bodies in revolution, such as the sun and earth, move around their common centre of gravity, this point being at a distance from either body inversely proportional to the mass of the body. The sun's mass is 331,000 times greater than that of the earth. The common centre of gravity is, therefore, 331,000 times nearer the sun than the earth ; in fact, it is inside the sun's surface.

The Members of the Solar System are :—

(1) The Sun ; the central body.

(2) Eight large planets named Mercury, Venus, The Earth, Mars, Jupiter, Saturn, Uranus, Neptune, this being their order of distance from the sun. A planet has been suspected nearer the sun than Mercury, and one more distant than Neptune.

(3) A number of minor planets, or asteroids, revolving between the orbits of Mars and Jupiter, about 340 being now known. They probably represent a planet broken up in the course of formation.

(4) The Satellites of the Planets. The Earth has one ; Mars, two ; Jupiter, four ; Saturn, eight, and a system of rings ; Uranus, four ; Neptune, one.

(5) Comets. About 700 have been recorded in historic time, but a much larger number must have been invisible.

(6) A number of swarms of meteorites and innumerable scattered meteoritic particles.

The orbit of each planet is an ellipse, having the sun in one focus. In consequence of this, the distance of a planet from the sun varies during a revolution. The *relative* distances of the planets are as follows :—

Name of Planet.	Distance in Terms of the Earth's Distance, 93,000,000 Miles.
Mercury	0·4
Venus	0·7
The Earth	1·0
Mars	1·5
Minor Planets	3·0 (about)
Jupiter	5·2
Saturn	9·5
Uranus	19·2
Neptune	30·1

The *absolute* distance of a planet is obtained by multiplying the relative distance by 93,000,000 miles.

Bode's Law. If four is added to each of a series of numbers in geometrical progression from 0, the results obtained, divided by 10, represent the relative distances of planets from the sun.

Planet.	Mercury	Venus	Earth	Mars	Minor planets	Jupiter	Saturn	Uranus
Geometrical Progression.	0	3	6	12	24	48	96	192
+ 4	4	4	4	4	4	4	4	4
Total	4	7	10	16	28	52	100	196
Divided by ten	0·4	0·7	1·0	1·6	2·8	5·2	10·0	19·6

When this law was discovered, the existence of a planet between Mars and Jupiter was unknown. A search for the body to fill up the gap led to the discovery of the first minor planet. For some unexplained reason, this law fails in the case of Neptune.

Elements of an Orbit.—The size, form, and position of the orbit of a planet are completely known when the following elements have been determined (1) mean distance, (2) eccentricity, (3) inclination, (4) longitude of ascending node, (5) longitude of perihelion, (6) the epoch.

The Mean Distance is half the length of the major axis, that is, the semi-major axis. This is intimately connected with the periodic time, in a manner to be described later.

The Eccentricity is the ratio which the distance from the centre of the orbit to the sun bears to the simi-major axis. Leaving comets and minor planets out of consideration for a time, the orbital eccentricities from the greatest to the least are as follows—Mercury, 20·6 ; Mars, 9·3 ; Saturn, 5·6 ; Jupiter, 4·8 ; Uranus, 4·7 ; the Earth, 1·7 ; Neptune, 0·9 ; Venus, 0·7.

The Inclination is the amount by which the plane of a planet's orbit is inclined to the plane of the earth's orbit (plane of the ecliptic). For the principal planets this element is approximately as follows :—Mercury, 7° ; Venus, 3° 24′ ; Saturn, 2° 30′ ; Mars, 1° 51′ ; Neptune, 1° 47′ ; Jupiter, 1° 18′ ; Uranus, 0° 46′ ; The Earth, 0° 0′.

Nodes.—A planet whose orbit is inclined to the ecliptic plane describes half its path north of the plane and half south. The point at which it cuts the plane in passing from south to north is termed the *ascending* node, that at which the planet descends from north to south, the *descending* node. The line joining these two points is the *Line of Nodes*. It is the common section produced by the cutting of two planes, viz, the plane of the planet's orbit and the plane of the ecliptic.

The Longitude of the Ascending Node is the angular distance of the node from the First Point of Aries, that is, angular distance

from the point occupied by the sun at the spring equinox. The following table shows this element for the principal planets :—

Neptune	130° 6′ 25″	Uranus	73° 13′ 54″
Saturn	112 20 53	Mars	48 23 53
Jupiter	98 56 17	Mercury	46 33 0
Venus	75 19 52	The Earth	0 0 0

The Longitude of Perihelion is the angular distance of the perihelion point from the First Point of Aries. The following are values of this element :—

Mars	333° 17′ 54′	Saturn	90° 6′ 38″
Uranus	170 50 7	Mercury	75 7 14
Venus	129 27 15	Neptune	45 5943
The Earth	100 21 22	Jupiter	11 5458

The Epoch is the particular time at which the planet occupied a certain place in its orbit, and to which all calculations of positions have to be referred. The elements of orbits are subject to slight changes, but if the form at any given epoch is known and the rate of variation, then the form at a previous or future date can be estimated.

Sidereal and Synodic Periods are the periods of time which a planet takes to pass from a star to the same star again, as seen respectively from the sun and from the earth. The former represents the true time of revolution round the sun, and is often termed the *period* or *periodic time*.

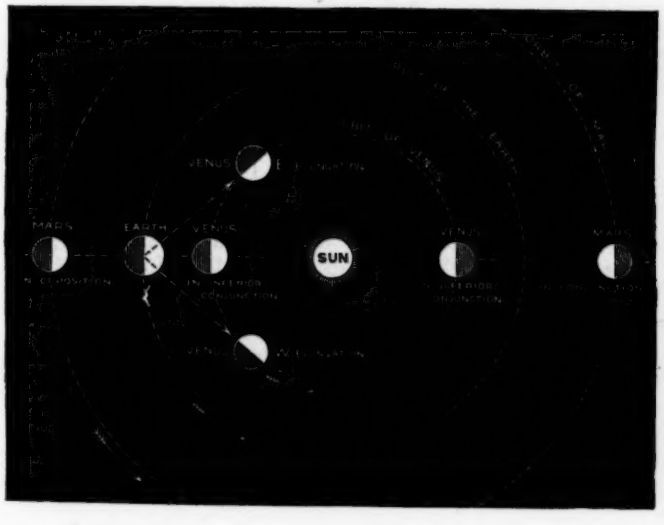
Planet.	Sidereal Period.	Planet.	Synodic Period.
Mercury ..	3 months	Mercury	116 days
Venus	7·5 „	Neptune	367 „
The Earth ..	1 year	Uranus	370 „
Mars	1·8 years	Saturn	378 „
Jupiter	11·9 „	Jupiter	399 „
Saturn	29·5 „	Venus	584 „
Uranus ..	84·0 „	Mars	780 „
Neptune ..	164·8 „		

If E represent the sidereal period of the earth; P, that of another planet, and S, the synodic period of the planet ; then—

$$\frac{1}{S} = \frac{1}{E} - \frac{1}{P}.$$

Direct and Retrograde Motion are respectively motions opposite to that of watch-hands, and in the same direction as watch-hands, to an observer north of the ecliptic. The motions of revolution and of rotation of all the planets are direct. Viewed from the earth, *direct* motion is eastward motion among the stars, and *retrograde* motion is motion towards the west.

Conjunction, Elongation, Quadrature, Opposition.—A body is in *conjunction* when it comes on the meridian at the same time as the sun ; if the body and the earth are on the same side of the sun, *inferior conjunction* occurs ; if on opposite sides, *superior conjunction*. Its angular distance from the sun, as seen from the earth, is termed *elongation*. When the elongation is 90°, the body is in *quadrature*, and when it is 180°, the body comes on the meridian twelve hours after the sun, and is said to be in *opposition*. The elongations of Mercury and Venus (inferior planets) cannot exceed 29° and 47° respectively, those of planets whose orbits are outside that of the earth (superior planets) may have any value up to 180°.



Rotation of Planets.—The period of rotation of a planet is determined by observations of returns of the same spot or marking on the planet's disc to the same position. Hence, when the markings are not well defined the rotation period cannot be accurately found. The periods known without the possibility of a large error are—

Mars	24 hours 37 mins.	Saturn	10 hours 14 mins.
[The Earth]	23 „ 56 „	Jupiter	9 „ 55 „

Periods of other planets are doubtful.

The Inclination of the Equatorial Plane of a Planet to the Plane of Revolution is found by observing the paths followed by spots and markings on the disc. It has only been accurately determined for the following planets—

Saturn ..	26° 49′	[The Earth] ..	23° 27′
Mars ..	24° 50′	Jupiter	3° 5′

The seasons on a planet depend upon the amount of inclination of the equatorial to the orbital plane. Saturn has, therefore, the most pronounced seasons, Mars and the Earth have seasons very much alike, and on Jupiter the succession of the seasons is almost unknown.

Satellites of planets accompany their primary in the revolution around the sun. Some points referring to their motions and orbits are :—

(1) *Distance from primary planet.*—This is known with a fair degree of accuracy. Mars has the nearest satellite, its distance being 5,850 miles ; whilst the eighth satellite of Saturn, at a distance of 2,225,000 miles, is the most removed from its primary. The distance of our Moon (240,000 miles) is a little less than that of Jupiter's first satellite, a little more than that of the attendant of Neptune, and twice as great as that of the nearest satellite of Uranus.

(2) *The periods of satellites* are known to fractions of a second. Our Moon has a sidereal period of 27⅓ days ; the last satellite of Saturn, with a period of 79¼ days, is the only one with a longer period. Mars' first satellite performs a revolution in 7½ hours ; Jupiter's first in 1¾ days ; Saturn's first in 22½ hours, that is, about a day. The first satellite of Uranus has a period of 2½ days, and the only attendant of Neptune revolves round its primary in a little less than six days.

(3) *Eccentricity of Orbit.*—With the exception of the moon, and the seventh satellite of Saturn, all the satellite orbits have very small eccentricities, indeed, they are practically circles.

(4) *Inclination of Orbit to Equatorial Plane.*—This datum is doubtful in cases where the position of the plane of the equator is undetermined, as in Uranus and Neptune. For other planets, all the satellites, except our moon and Saturn's outermost companion, move in planes which coincide with the equatorial planes of their respective primaries.

Comets and Meteors are intimately connected with one another, but differ from the planets and satellites both in their orbits and physical structure.

Periodicity of Comets.—Halley discovered that the comet of 1682 revolved round the sun in a period of 76 years. He predicted the return of the comet in 1759, and his prediction was fulfilled. This proved that the comet moved in an elliptical orbit. The periodicity of another comet was discovered by Encke in 1819. The time of revolution of this comet is 3½ years, this being the shortest period at present known.

Elliptical, Parabolic, and Hyperbolic Orbits.—An ellipse is a closed curve, so a body moving in an elliptical path comes back in time to the starting-point. When the two foci of an ellipse are separated by an infinite distance, a parabola is produced. This is not a closed curve, so a body moving in a parabolic orbit never returns. Hyperbolic orbits possess the same peculiarity. The relative numbers of comets known to be moving in these orbits are as follows :—

Elliptical (periods less than 100 years) ..	28
Elliptical (periods more than 100 years) ..	25
Parabolic	220
Hyperbolic	6 (?)

The Motion of Comets is direct for all having periods less than 100 years, except Halley's comet and one that appeared in 1886. The other groups seem to show no preference either one way or the other.

The Inclination of Cometary Orbits to the Ecliptic varies from 0° to nearly 90°. The orbit of Halley's comet has an inclination of 17° 45′ ; and of Encke's, 13° 7′.

The Peculiarities of Cometary Orbits, as compared with orbits of planets and satellites are (1) High eccentricity; (2) Direction of motion often retrograde; (3) Often considerably inclined to the ecliptic.

Origin of Parabolic Comets.—It is now generally believed that comets having parabolic orbits have been drawn into our system from outer space by the attraction of the sun and one of the larger planets. This is supported by the fact that the orbits do not lie near the ecliptic, like the orbits of planets and satellites.

Capture Theory of Periodic Comets.—If a comet, moving in a parabolic orbit, has its velocity increased by passing near a planet, the parabola is transformed into a hyperbola, and the comet leaves the solar system, never to return again; if the velocity is decreased, the parabola is changed to an ellipse, and the comet becomes periodic. In this case the comet must return, after a time, to the point where the disturbance occurred. It is found that the seventeen comets having periods from three to nine years pass very near to the point occupied by Jupiter at aphelion. This unequal distribution along the ecliptic cannot be accidental, and is in favour of the capture of comets by Jupiter. The other major planets also have 'comet families' of their own.

Ejection Theory of Periodic Comets.—If, during an eruption, matter were ejected from a planet with sufficient velocity, it would leave the planet altogether, and describe an orbit similar to the orbit of a short-period comet. The ejected matter would return after a time to the point where the explosion occurred. Relying on these facts, it has been suggested that periodic comets were ejected from the sun and planets instead of being captured from outer space; but this theory is not now generally accepted.

Meteoric Orbits.—More than one hundred swarms of meteorites are known to revolve round the sun in very eccentric orbits. When the earth comes into collision with such a swarm, a 'meteoric shower' occurs. If the swarm is condensed, the collision only happens when it and the earth reach the 'level-crossing' together; if the meteorites are spread out along the orbit, then a shower occurs every year when the earth crosses the orbit. An examination of records of meteor-showers by Professor Newton, in 1864, showed that brilliant displays occurred in the month of November at intervals of 33¼ years. By following up this result, it was proved that the swarm moved round the sun, in a very eccentric orbit, once in about 33 years.

Connection between Comets and Meteors.—In 1866 the orbit of a comet—known as Tempel's—was found to be nearly identical with that of the November swarm of meteorites. A little later, the meteors that appear in August were found to move in an orbit having nearly the same elements as a comet which appeared in 1862. The connection in one of these cases will be seen from the following comparison of elements:—

Elements of Orbits.	Meteoric Orbit.	Orbit of Tempel's Comet.
Perihelion Distance	0·9893	0·9765
Eccentricity	0·9033	0·9054
Semi-axis Major	10·340	10·324
Inclination	18° 3′	17° 8′
Longitude of Ascending Node	51° 28′	51° 26′
Period in years	33·25	33.17
Direction of Motion	Retrograde	Retrograde.

Five similar coincidences of cometary with meteoric orbits are now known, and serve to establish the identity between the two groups of bodies. Evidence of the connection is also afforded by analysis of the light of comets and meteorites. This will be described later.

Questions on Astronomy.

(1) State what you know about the 'Aberration of Light.' (1890.)

(2) How was the connection between comets and meteors established? (1887.)

(3) What are the chief elements of a planet's orbit? (1884.)

(4) What is the synodic period of a planet? (1882.)

(5) How does Foucault's pendulum experiment prove the rotation of the earth? (1885.)

(6) How is the synodic period of a planet determined, and how can the sidereal period be deduced from this?

(7) What are the causes of the apparent daily and annual motions of the stars?

(8) Define Conjunction, Opposition, Quadrature, Node and Apse-line.

(9) What is the cause of the seasons? Contrast the seasons of Mars and Jupiter. (December, 1885.)

Questions on Physical Geography.

(1) What is lava? In what forms does it appear at the earth's surface? State what you know concerning the composition and different varieties of lava. (1890.)

(2) State the nature and mode of formation of the substance known as 'travertine' and 'sinter'? (1887.)

(3) Describe the physical characters and chemical composition of the minerals called felspars. (1886.)

(4) Give the names of the minerals which make up the rocks called 'granite,' 'trachyte' and 'basalt,' and state what you know concerning the chemical composition of each of these rocks. (December, 1883.)

(5) State what you know concerning the physical properties and the chemical composition of quartz, felspar and mica. (December, 1885.)

PRACTICAL NEEDLEWORK.

BY MISS J. W. WARREN,

Inspectress of Needlework, Leicester School Board.

STANDARD V.—The plain darn of a hole has not yet been described, and although it doesn't differ much from the first darn on a thin place a little direction is needed.

First introduce this exercise by a talk on the utility of stocking darning; give very full directions as to the right amount of strength required; fully explain the necessity to *double* the *work* not only over actual hole, but *several* threads of *web* on each side. This is not often done, but it certainly should be. Note to the pupils also that the mending wool or cotton must be a little stouter than the woven thread of the old stocking (in your case the new material). The reason is obvious. When interest is awakened, but not till then, provide each girl with a piece of stocking web; let her mark, by a coloured cotton, round a portion to *indicate* a hole, but do not at first have one made. Now let her make a square darn up and down until she reaches the cotton line; here first by one stitch, then two in next line, and so on; she should *miss* or *pass over imaginary hole* (see diagram), increasing her pass stitch so as to insert needle *just at the cotton line* of hole until finally, with one small stitch, it is bound and plain thin place darning is resumed to complete the square.

I am aware of the novelty of this progressive method, but I am also equally sure of its success—by thousands of proofs—and I recommend it to all thoughtful teachers. Now when crossing *such a darn* you will show the girls how the hole is filled in by the weaving process necessary in all plain darning, and you will *gradually* lead to the difficulty of the *actual hole* without bounding into it as is usual in the old method. Here take your specimen and cut out the piece over which you have made *a filled-in weave darn.* Show pupils raw edges, and teach that in the *real hole* these must be neatly darned in or worked in beforehand and, if very large, *drawn-to* with thread before the darn is actually begun. By this time you will have gained intelligence enough in the class to gauge the hole work successfully.

Now the Hole.—A hole in an actual stocking is jagged, rough, gaping, and thin all round. Such a hole, if as large as a threepenny piece, should be *carefully drawn closer with fine white cotton*, because to mend neatly without is impossible. After the darning is finished, the white cotton should be cut in several places and drawn out.

Mode.—Square at first. Take your specimens, cut one or two threads, push finger through. Do not attempt to pick this out for a square hole, but let your pupils darn over the loosened stitches, picking up where necessary, and making partially imaginary stitches over hole. Keep roughness to wrong side by the use of left-hand fingers, but *darn* in loose threads, do not cut them off. It is an utterly false notion that a darned hole should look like a lattice-work. It should look as opaque as you can make it; and not by darning only, but by using such loose threads as lie round about it.

Now, in crossing, take care to bound the hole beyond its edges several threads. The general custom is merely to cross the open strands; but the idea of strength is a fallacy, as instanced by judges who often can poke fingers right through an otherwise well-mended hole.

Lastly, the darn may be made of a shape other than a square. (See Standard III. Specimen.) But when a square is used, do not take up to same thread each row, vary this by one or two threads.

The Code requirements of VI. and VII. Standards are the same, with the exception of the Whip Frill, which is to be done in the VII. only. I note that there are in all eight separate specimens, of which I purpose to give as full explanation as is necessary, so as not to repeat what has been said in previous Standards.

Cutting out Chila's Pinafore.—Take any pattern suitable for the district. Let it be about big enough for a child of six years. Use soft brown tissue paper. This you can get upon application where fruit bags are made. If you can get this of a size to cut the whole garment, do. A plain pinafore, pleated into a band, back and front, with sleeves formed of a *slit* only, and banded across the shoulders on to the back and front bands, is one of the simplest and best-fitting for the purpose.

Mode of Work.—Have a pinafore made, another cut out, and paper to cut; blackboard and chalk. Pin the pinafore to blackboard with drawing-pins. Show, by direct contact, the fulness in band. Next put made paper pattern on, and *cut off bands* to show extension of material. Next take paper and place on blackboard; draw round a piece folded down centre. The field will measure *x* by *y*. Explain this step carefully, then give each pupil a piece of paper, tape measure, scissors, and pencil. Let him fold it in centre, and, by means of pencil and tape, mark off the field for work; and, after having done this, the two points for arm, opening top and bottom, cut lengthwise the length of neck and shoulder bands, and your pattern is ready to cut.

For a girl's chemise the one given in this book will do very well, and should be treated in the same manner as the pinafore.

Cutting out generally in Schools.—This is a most important branch of the Code, and should be well taught on *class lines throughout.* No miserable details that can be avoided should be put in, but common-sense explanations of the general requirements given. Wherever possible give folded slopes. Curves should be indicated at *every inch* only; all inlying points should be measured from the nearest side of the field from which you cut. Keep a calico pattern of each garment, and use it at every lesson.

Cut and Work a Button-hole.—This is only a revision of the specimen done in Standard IV., and is doubtless to test whether old work is rightly kept up. It should be done on finer calico, and smaller, and might be barred at both ends. As a full explanation and diagram was given of this work, no more need be said.

The Cut on Coarse Linen for Darning.—Evidently the main use of this is to teach the darning of knife-cuts in table-linen. Keeping this end in view, we see that it must be *neat* rather than *strong*. It will be both if done well; but the first thing to remember is that it must be *neat. This, and all other darning in the girls' school course* must be done on the wrong side of material. I mention this because doubts are always cropping up as to what shall be and what shall not be done on the right side. There are two occasions when it is advisable to darn on right side: (1) *A stocking when feet are tender, hot, and moist;* (2) *when material*, e.g. *dress, is mended with a prepared square of material by means of drawn threads.* But to return to my specimen. Material.—Coarse linen: instead, you might purchase some unprinted shirting, as recommended for III. Standard stitching. It is better to begin to teach it upon canvas, which should not be cut, but have a line of cotton of some bright colour to indicate the *cut.* Later on, when using linen, a pencil mark should still first take place of actual cut.

Shape of Darn required for This Cut.—Either two right-angled isosceles triangles or two rhomboids. The cut when finished should lie parallel with the bases of triangles, and midway between apex and base if the rhomboidal form is used, and it is here highly recommended. The cut, when darn is finished, should be parallel, with shorter sides, and exactly midway between them. It will be seen that by this second method the edges of cut lie well within the darn, and nowhere near the loops left for the washing, perhaps the greatest advantage over the triangles; but another is that the number of stitches given for a start regulates the whole work, and, again, the looped edges together and further apart.

Plan of Work.—By glancing at the appended diagram we see that the cut lies within a square of double or cross darning that is somewhat larger in diagonal than the cut itself from end to end. This square must, of course, always be determined by the cut, but ours here is given as a quarter of an inch cut, and we therefore observe that the diagonal of the square is half an inch, or less. The points of work can be accurately determined by the following easy plan, and these should be taught to each pupil:—Take a square of paper whose sides are the same length as the cut. Having made the cut, crease your square of paper from corner to corner both ways; put one of these folds on your cut middle to middle—your cut is now covered by the square of paper—crease your linen all round the square, take it off and find four points, *two of which lie near the edges of cut*, and two much further away. We will suppose

this cut *runs from left to right downwards*. Now from the corner at right, furthest from cut, make the fold, already begun, just as long again *downwards*, passing the edge of cut; this line is the first line to be worked, and is the long side of first rhomboid; parallel you will see another fold with corner or *point near edge of cut*, run this fold *upwards* the length of side of square; you now have second long side of the figure and last line of first rhomboid to be darned; the shorter sides are looped, the longer sides are the sides of work. Now turn your cut right round so that it lies from *right to left*, and do the other rhomboid in exactly the same way, and the whole thing is ready for work. I believe if teachers would demonstrate this difficult darn in this way it would lose all its terror and only retain its beauty, for it is a beautiful work of art when finished.

How to Work.—Use a long darner, and if the linen is coarse enough, take up one thread, but two if not; when crossing, pick up material as well as cotton, and do not skip over the fringe of cut, but work *right through it*, pressing it up from right side with fingers, and down on wrong with thumb of left hand. Coloured cotton should be used, and different for each darn; let your pupils see every process and make all their own markings; do not use a blacklead pencil, nor accustom them to anything but the folding. The increase upwards must correspond with the decrease downwards to form the shorter sides of rhomboid. The cut should be introduced as soon as the shape has been thoroughly mastered, as the actual darning is simple and straightforward. This work is done on very fine canvas cloth in some districts, but it is not a desirable thing, as it is really necessary to do it on linen to get any practical lesson from it.

The Print Patch.—For this it is necessary to have striped, spotted, and flowered patterns of print. The old plan of using only striped is quite gone out. Flowered prints are so much worn that one would be almost safe to keep to this design, given a variety.

Object of the Teaching.—To make a neat and *unseen* repair in an outer garment, a garment that is frequently in the hands of the laundress, and therefore must be subjected to rough usage.

Preparation.—Choose carefully your print. Notice that the pattern is regular and as little out of the line of thread as possible. It should, too, be such as to admit of the occurrence of the pattern at somewhat close intervals, or else there is waste in matching.

Be careful, too, in cutting patch and piece for pupils. A print pattern sometimes only comes up again several inches apart, and not infrequently do teachers give children matching that by reason of the patterns not recurring on the piece given is rendered useless. Choose a print with very little dress in it.

Teaching.—Give several lessons on the work before you actually allow the girls to do it themselves, show them that they cannot keep this patch in the middle as in the two elsewhere taught; let them also see that while easy to find the right side, the patch is rendered difficult because the printing, especially in common material, is often out of line; that their patches *may be in a corner and may look crooked*, and yet be perfectly right; that they *must match the pattern*, and not be careful about the threads.

(To be continued.)

THE 1892 CERTIFICATE EXAMINATION.

BY DR. GEORGE BEACH, M.A.,

Co-Author of 'A Manual of our Mother Tongue,' 'A Girls' Arithmetic,' Author of 'Elements of English,' 'Entertaining Readers,' etc.

I. Remarks on Routine.

First Year.

(*a*) Parse fully:—*as, fit, as, mantle, other, seem, are, being, too,* and analyse the passage—

'Long and curious speeches . . . . . in men's wills,' OR

Parse fully:—*Philosopher, who, keep, That, silent, Haunted, blest, whom, truths, which, are toiling, all, lost, darkness, whom, like, Day.* (First Friday.)

(*b*) 'The very law that moulds a tear,
And bids it trickle from its source;
That law preserves the earth a sphere,
And guides the planets in their course.'
(Third Friday.)

(*c*) Parse fully:—*it, pleasing, to have, than, work, judge, therefore, Certainly, like, odours, fragrant, crushed,* and analyse the passage—

'We see in needleworks . . . . . incensed or crushed'; OR

Parse fully:—*birth, yet, where'er, that, there, glory, Now, while, thus, As, alone, there, thought, thought, relief, strong.* (Fourth Monday.)

Second Year.

(*a*) Parse fully:—*As, repassed, to train, For, be, it, understood, always, good, Seemed, some, forth, to play, stout, passing, out,* OR

Brother, best, armed, no, man, if, there, be, any, what, heard, but, faintly, nothing, like, horror, away. (First Monday.)

(*b*) Parse fully:—*What, stay, certainly, be, that, bondage, to fix, affecting, as well as, though, remain, which, are, as, was*; OR

General, worth, dust, which, that, which, it, be bordered, certain, herself, disbranch, her, perforce, wither. (Second Friday.)

(*c*) Parse fully:—*as, to go, as, that, is increased, other, contemplation, passage, religious, due,* and analyse the first six lines as far as—. . . . 'due unto nature is weak'; OR

Wherefore, Because, would, Pluck, nor, stick, sea, as, Yet, heart, If, howled, time, should'st have said, porter, cruels, else, subscribed, vengeance. (Third Monday.)

(*d*) Parse fully:—*Not, Who, goodliest, at, once, like, way, smilets, That, to know, What, guests, which, parted, As, dropped, would be, If, become.* (Third Friday.)

II. Bacon's Antitheta.

Essay XXXVIII.

For.	Against.
1. In custom we have Arithmetical, in nature Geometrical progression.	1. We think according to nature, we speak according to instruction, but we act according to custom.
2. As common laws are to customs in States, so nature is to custom in individuals.	2. Nature is a bookish schoolmaster; custom is a magistrate.
3. Custom, when opposed to nature, is a kind of despotism: soon and lightly overthrown.	

III. Remarks on Bacon's Essays.

(*a*) The first edition was given to the world in January, 1597. They formed part of a small book dedicated '*To M. Anthony Bacon, his deare Brother,*' which comprised in addition '*Places of Persuasion and Disuasion*' and '*Religious Meditations.*' They were only *ten* in number, and were as follows:—

1. Of Studie.
2. Of Discourse.
3. Of Ceremonies and Respects
4. Of Followers and Friends.
5. Sutors.
6. Of Expence.
7. Of Regiment of Health.
8. Of Honour and Reputation.
9. Of Faction.
10. Of Negociating.

In 1612 the second edition, containing thirty-eight essays, appeared, with a dedication to Sir John Constable, who was the husband of Dorothy Barnham, the sister of Lady Bacon.

The essayist had already written a dedication to Prince Henry, but upon his death substituted the one above referred to.

Thirteen years later, he reprinted them, having increased their number to fifty-eight, which, together with a fragment of an Essay on Fame, is their complete tale.

(*b*) In most of the modern editions of the Essays the spelling has been modernised. Just as in the case of THE BIBLE and *Shakespeare*, it is considered that they are not for an age, but for all time. However, we give a short extract, in order to show the orthography of the first edition.

OF STUDIES.

'Studies serue for pastimes, for ornaments, for abilities; their cheife vse for pastimes is in privateness and retiring; for ornaments in discourse; and for ability in Iudgment and disposal of business; for expert men can execute, but learned men are more fit to Iudge and censure: to spende to much time in them is sloth: to vse them to much for ornament is affectation: to make Iudgement wholely by their rules is the humor of a scholler: they perfect nature, and are themselues perfected by experience: crafty men contemne them, wise men vse them, simple men admire them. for they teache not their owne vse, but that there is a wisdome w^th^out them, and aboue them wonne by observation: Reade not to contradict, nor to beleeue, but to weigh and consider.'

(*c*) The best edition to possess, in addition to 'Lewis,' is that in two volumes by Dr. Abbott contained in the 'London Series of English Classics.'

IV. GRAMMATICAL PECULIARITIES OF KING LEAR. (*Continued* from p. 167.)

[The lines are denoted by the numbering of the *Globe* edition.]

Did = cause or make—

'*Do* me some charity.'—III., iv., 61.
'This fellow *did* the third a blessing.'—I., iv., 115.

Do, omitted before a negative—

'I marvel our mild husband
∧ Not met us on our way.'—IV., ii., 2.

Compare Tempest, II., i., 121; V., i., 38.

May, original use of

'Whiles I *may* escape
I will preserve myself.'—II., iii., 5.

May originally denoted not 'permission,' but 'ability.'

Can, orginal use of—

'What *can* man's wisdom
In the restoring his bereaved sense?'—IV., iv., 8.

Can in Anglo-Saxon expressed '*knowing how to.*'

Shall = will—

'He that parts us *shall* bring a brand from Heaven.'—V., iii., 22.
See also I., i., 36, and IV., vi., 246.

Use of will—

Shakespeare uses *will* in the first person to express wish or desire, and not mere futurity, although there are traces of the influence of the latter usage.

'We *will* divest us.'—I., i., 50,
'I *will* forget my nature.'—I., v., 35.
See also III., vii., 69; IV., vi., 253.

Would = wish, desire—

'Keep me in temper. I *would* not be mad.'—I., v., 51.

Third person plural in -s following the northern Early English inflection,

'Which very manners *urges*.'—V., iii., 234.

This usage is not to be confounded with the use of a singular verb with Plural Subject.

Participial -ED *omitted after* D *and* T—

'And find I am alone *felicitate*.'—I., i., 77.
'Better I were *distract*.'—IV., vi., 288.

Participial -N OR -EN *omitted—*

'Which often leaves the history *unspoken*.'—I., i., 239.
'This courtesy, *forbid* thee, shall the duke
'Instantly know.'—III., iii., 22.

Present Participle for Past—

'Known and *feeling* [felt] sorrows.'—IV., vi., 226.

Passive Participle in -ED *used for* -ABLE—

'This *unprized* precious maid.'—I., i., 262.
'The murmuring surge
'That on the *unnumbered* idle pebbles chafes.'—IV., vi., 21.

Past Tense for Past Participle—

'He hath *wrote* this.'—I., ii., 93.
'Which thou hast perpendicularly *fell*.'—IV., vi., 54.

Future for Subjunctive—

'If you *shall see* Cordelia.'—III., i., 46.
See also I., ii., 87.

Simple form of Subjunctive—

'*Say* thou "No."
'This sword, this arm, and my best spirits are bent?'—
V., iii., 138.

Subjunctive used Optatively—

'*Answer* my life, my judgement,
'Thy youngest daughter does not love thee least.'—I., i., 153.

Omission of Pronoun with Participle—

'When he, conjunct and flattering his displeasure,
Tripped me behind: ∧ being down, insulted, railed.'—II. ii., 127. See also III., ii., 265.

Participle omitted—

'I have heard him oft maintain it to be fit that, sons [*being*] at perfect age and fathers declining, the father should be as ward to the son.'—I., ii., 77.

Compare 'face ∧ to face'; 'sword ∧ in hand,' etc.

Ellipsis—

'What are you?
[*I ask*] Your name and quality.'—V., iii., 120.

'Five days we do allot thee for provision
And on the sixth [*we command thee*] to turn thy hated back.—I., i., 178.

Ellipsis with AS—

'Return those duties back *as* [*they*] are most fit [*to be returned*].'—I., i., 99. See also Macbeth III., iv., 138; Coriol II., ii., 30.

Ellipsis with IF—

'*If* [*it is*] for (= because) I want that glib and oily art.'—I., i., 227.

Ellipsis in antithetical sentences—

'What most he should dislike seems pleasant to him
What [*he should*] like, [seems] offensive.'—IV., ii., 10.

'To know our enemies' minds we'ld rip their hearts,
[*To rip*] their papers is more lawful.'—IV., vi., 266.

'To be acknowledged, madam, is [*to be*] overpaid.'—IV., vii., 4.

Ellipsis of Nominative—

'The king must take it ill
That he's so lightly valued in his messenger,
[*That you*] should have him thus restrained.'—II., ii., 154.

[*He*] Bids the wind blow the earth into the sea.'—III., i., 5.
See also II., iv., 42; I., i., 213; I., i., 225.

Ellipsis of -LY—

'*Safe* ∧ and nicely I might well delay.'—V., iii., 144.

(To be continued.)

V. OFFICIAL MEMORANDUM ON WRITING.

'It is quite evident from an examination of the exercises that, except in very few instances, writing has not received the attention that it ought, considering its practical value, and the number of marks awarded to it.

The most noticeable errors are:—

(*a*) Want of uniformity in the thickness of the straight line.
(*b*) Roughness of stroke.
(*c*) Letters too tall or too short.
(*d*) Links and hooks too thin or too fine.
(*e*) Curves wrongly formed.
(*f*) Letters not properly joined.

The best writing was characterised by:—

(*a*) Accuracy in the form of letters.
(*b*) The good inclination and parallelism of the whole exercise.

(*c*) The careful spacing of the letters.

(*d*) The fact that the dictation exercise bore out the style and character of the copy-setting. (*Circular to Training Colleges.*)

VI. As candidates may be asked to discuss the question of vertical versus sloped writing we cull the pith of the remarks made by Mr. John Jackson, F.E.I.S., in an article contributed to '*The Journal of Education.*'

He claims that :—

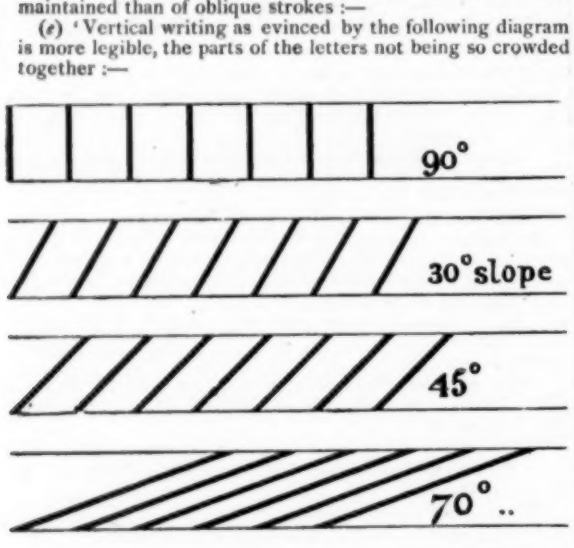
(*a*) 'Up to about the sixteenth century all writing was vertical :—

(*b*) 'Sloped writing is the sole cause of scoliosis, and the primary cause of myopia :—

(*c*) 'Vertical writing neither requires nor permits any postures of a painful or injurious character :—

(*d*) 'The parallelism of vertical strokes is more easily maintained than of oblique strokes :—

(*e*) 'Vertical writing as evinced by the following diagram is more legible, the parts of the letters not being so crowded together :—



(*f*) 'Economy of time, space, labour, and expense results.'

FIRST YEAR.

VI. Algebra.

The following 'proofs' have been requested during the last twelve years. It is scarcely too much to say that none others, except such as are deducible from these, have been given :—

(*a*) If $\frac{a}{b} = \frac{c}{d} = \frac{e}{f}$, then $\frac{a}{b} = \frac{ma + nc + pe}{mb + nd + pf}$ (Twice).

(*b*) $S = \frac{a(r^n - 1)}{r - 1}$ in G.P. (Four times).

(*c*) $S = \frac{n}{2}\{2a + (n-1)d\}$ in A.P. (Five times).

(*d*) A ratio of greater inequality is diminished and a ratio of less inequality is increased by adding the same quantity to each term (Three times).

(*e*) The rule for finding the G.C.M. of two expressions (Six times).

(*f*) Prove that a recurring decimal containing p figures is an infinite G.P. whose ratio is $\frac{1}{10^p}$ (Twice).

(*g*) The L.C.M. of A and B = A B ÷ by their G.C.M. (Once).

(*h*) The method of extracting the square root of $a + \sqrt{b}$ (Once).

(*i*) $(a^m)^n = a^{mn}$; and $a^m \div a^n = a^{m-n}$ (Twice).

(*j*) $\frac{a}{b} \div c = \frac{a}{bc}$ (Twice).

(*k*) The square root of a rational quantity cannot be partly rational and partly a quadratic surd (Once).

(*l*) The sum of the roots of the equation $x^2 - 2px + q^2 = 0$ is equal to $2p$, and their product to q^2 (Twice).

(*m*) If a and b are the first two terms in a H.P., then the n^{th} term is $\frac{ab}{(n-1)a - (n-2)b}$ (Once).

(*n*) The rule for square root (Once).

(*o*) When $n + 1$ figures of a square root have been obtained by the ordinary method n more may be obtained by division only, supposing $2n + 1$ to be the whole number (Once).

(*p*) When $n + 2$ figures of a cube root have been obtained by the ordinary method n more may be obtained by division only, supposing that $2n + 2$ to be the whole number (Once).

SECOND YEAR.

(*a*) The rule for casting out the nines in multiplication, showing in what cases it might fail (Three times).

(*b*) First year (*i*) (Once).

(*c*) The rule for cube root (Twice).

(*d*) The number of permutations of n things taken r together (Five times).

(*e*) Amount of a given sum at a given rate (C.I.) for a given number of years (Twice).

(*f*) Log. $\left(\frac{ab}{c}\right)$ = log. a + log. b − log. c (Five times).

(*g*) If A be a sum of money due n years hence at r per cent, (S.I.), and D the discount, then $D = \frac{A\,nr}{100 + nr}$ (Twice).

(*h*) The Binomial Theorem for positive integral powers (Four times).

(*i*) $M = P(1 + r)^n$ where P = Principal, M = Amount, r = compound interest of £1 for one year (Six times).

(*j*) First year (*f*) (Once).

(*k*) The number of combinations of n things taken r at a time = number taken $n - r$ (Three times).

(*l*) First Year (*o*) (Twice).

(*m*) If a, b, be employed as bases, log. $_b$ M = log. $_b a$ × log. $_a$ M (Four times).

(*n*) The formula to express the present value of an annuity to commence at the end of m years and to continue to n years (Three times).

(*o*) First Year (*e*) (Once).

(*p*) First Year (*a*) (Once).

(*q*) The number of combinations of n things taken r together (Three times).

(*r*) First Year (*l*) (Once).

(*s*) First Year (*e*) (Twice).

(*t*) First Year (*m*) (Once).

(*u*) The formula for finding the greatest term of $(1 + x)^n$, when n is an integer (Once).

(*v*) In the expansion of $(1 + x)^n$, there are $n + 1$ terms (Once).

(*w*) The A.P., G.P., and H. P. between any two quantities are in G.P. (Once).

(*x*) The sum of the coefficients of the terms in the expansion of $(1 + x)^n = 2^n$ (Twice).

(*y*) The sum of the coefficients of the odd terms = the sum of the coefficients of the even terms (Twice).

(*z*) First Year (*k*) (Twice).

(*α*) First Year (*n*) (Once).

(*β*) First Year (*c*) (Once).

(*γ*) First Year (*b*) (Once).

(*δ*) First Year (*m*) (Once).

(*ε*) The co-efficients of terms equally distant from the extremities are the same in the expansion of $(1 + x)^n$. (Twice).

VII. Mental Arithmetic.

(*Twenty minutes allowed.*)

1. Add together squares of 3, 4, 5, 6.
2. Interest on £400 at 5 per cent. for 7 months.
3. 3½d. per week for a year.
4. How many coins worth 2¼d. each could be obtained for £4 10s. ?
5. How many yards of carpet, half-a-yard wide, will be needed to cover a floor 24 feet × 18 feet ?
6. What must I pay for 3 doz. books at 9d. each, deducting 25 per cent. ?

7. As 80 : ( ) :: 72 : 54.

8. $(27)^2 + (72)^2$.

9. 7832 × 25 and 688 × 99.

10. $\frac{2}{5}$ of £1 + £1·35 + $\frac{7}{12}$ of 2½s. + ·3s.

11. Express as decimals of £1 the following sums :—18s., £2½, 15½s.

12. $\frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5}$.

13. Average height of A, B, C, D, A being 5 ft., B 5½ ft., C 5¾ ft., D 61 inches.

14. Divide £180 between A and B in the ratio of 33 to 12.

ANSWERS.

1. 86.	8. 5,913.
2. £11 13s. 4d.	9. 195,800, 68,112.
3. 15s. 2d.	10. £2 1s. 3½d.
4. 480.	11. ·9,2·25, ·775.
5. 96.	12. $\frac{13}{20}$.
6. £1 0s. 3d.	13. 5⅓ ft.
7. 60.	14. £132, £48.

VIII. The names of all Candidates, not being students in any Training College, must be notified to the Department before the 1st October (Art. 59). Candidates should also see that (*a*) in paragraph XVIII. of Form IX., the words 'Christmas Examination, First or Second Year Papers' should be written ; and (*b*) the Inspector has, at the annual examination of the school, an opportunity of giving a favourable report on their skill in teaching, reading, and recitation.

IX. We strongly advise all our Readers to procure 'MENTAL SCIENCE AND LOGIC FOR TEACHERS,' by *Mr. Thomas Cartwright, B.A., B.Sc.*, which may be obtained from any booksellers, or post free from the publishers, Hughes and Co., for 2s. It contains the last Six Years' Certificate Questions in Mental Science and Logic worked out in full as models, and is free from the artificial difficulties and abstruse treatment that prevails in most works of the kind.

SELECTED GOVERNMENT QUESTIONS.

FIRST YEAR.

SECOND WEEK OF MONTH.

1. Write in large hand the words '*Unhappily constituted.*'

Write in small hand the words '*Taught by the logic of events.*'

2. Write from Dictation :—

'The real security of Christianity is to be found in its benevolent morality, in its exquisite adaptation to the human heart, in the facility with which its scheme accommodates itself to the capacity of every human intellect, in the consolation which it bears to the house of mourning, in the light with which it brightens the great mystery of the grave. To such a system it can bring no addition of dignity or of strength, that it is part and parcel of the Common Law. It is not now for the first time left to rely on the force of its own evidences and the attractions of its own beauty.'—*Macaulay's Essays.*

3. Write brief Notes of a Lesson on one of these subjects :—

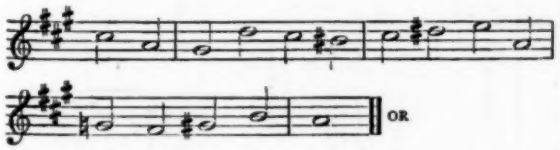
(*a*) The Cases of Pronouns.

(*b*) The House of Commons.

(*c*) (*For infants.*) Snow and hail.

4. How is '*Elementary Science*' provided for in the New Code? What place does it occupy in the scheme of study; and how is the work of its different departments described and graduated?

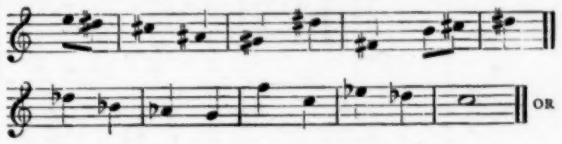
5. Transpose the following a major third lower, namely, into the key of F.



Which of the following notes is highest and which lowest in pitch ?

(1) m in Key C.
(2) s in Key D.
(3) r in Key B♭.
(4) l, in Key F.
(5) f in Key E.
(6) t in Key A.

6. State the key of each of the following passages :—



State the Sol-fa name (as *doh, fah*, etc.) of the following major scale relations :—

(1) Subdominant
(2) Octave
(3) Dominant
(4) Tonic.
(5) Mediant
(6) Supertonic.

7. What are the chief merits of Scott's or Wordsworth's poems? Quote from them any examples of felicitous epithets, of striking imagery, or of important truths which appear to you worth remembering.

8. Comment on :—(*Men only.*) 'The plains of Arbela,' 'Regiment of Health,' Celsus, 'The difference between saltness and bitterness,' Queching, Take the ply : OR, (*Women only.*) 'Do not quadrate with, Franchises of Parnassus, Frippery, Io Paean, Our protestant Rabbin, Ways and means, and supply.

9. Compare (*a*) the apparent positions of the sun at sunrise, at noon and at sunset as seen from St. Petersburg, Alexandria, Pieter Maritzburgh, (*b*) the time from sunrise to sunset, and (*c*) the duration of twilight, at these places on the 20th June (approximately).

10. (*Men only.*) What do you know of the military strength of Australia and Canada? Mention our chief coaling stations abroad.

(*Women only.*) State for each of the following names the time, and the part (or parts) of Africa which it suggests. Give approximate dates. The Assiento, the Califate, the Vandals, the Phœnicians, Alexander the Great, Belisarius, Cleopatra, Hannibal, Saint Augustine, Scipio.

11. What measures did William I. take to prevent the feudal lords from becoming independent? How did his two sons afterwards keep them in check?

12. (*Men only.*) What made all parties concur at first in the accession of James I.? Briefly describe the objects of the different plots against him.

(*Women only.*) What was the origin of the Crimean War? Draw a rough sketch map of the Seat of War. What special achievements are connected with Silistria and Kars?

13. A can beat B by 5 yards in a 100 yards race, and B can beat C by 10 yards in a 200 yards race. By how much can A beat C in a 400 yards race? Ans. 39 yards.

14. (*Men only.*) Two boats start to row a race at 3 o'clock. The race is over at 6¾ minutes past 3, the losing boat being 40 yards behind at the finish. At 4 minutes past 3 this boat was 700 yards from the winning post. Find the speed of each boat in miles per hour. Ans. $9\frac{297}{352}$; 9¼.

(*Women only.*) The fore-wheel and hind-wheel of a carriage being respectively 8¼ feet and 13¾ feet in circumference, how many more revolutions will the fore-wheel make than the hind-wheel in going over a distance of $19\frac{7}{8}$ miles? Ans. 4,350.

15. (*Men only.*) Find the area of a circular ring 3 feet wide, of which the larger circumference is 100 feet.

Ans. 271·725 . . . sq. ft.

(*Women only.*) To what extent should cutting out be carried in a girls' school? What time should be given to this portion of work, and what devoted to needlework?

16. (*Men only.*) Find the external surface of a 4-inch drain-pipe 1 yard long? Ans. 3¼ sq. ft.

(*Women only.*) Explain fully why mischief should ensue from (*a*) not airing bed-clothes daily, and (*b*) from not properly airing under-clothing.

17. (*Men only.*) A vessel can be filled with water by two pipes. By one of the pipes alone the vessel would be filled 2 hours sooner than by the other. Also the vessel can be filled by both pipes together in 1⅞ hours. Find the time which each pipe alone would take to fill the vessel. Ans. 5 hours and 3 hours.

(*Women only.*) Describe some simple means of ventilating rooms without creating draughts.

CERTIFICATE ROUTINE FOR OCTOBER, 1892 (MEN AND WOMEN, SECOND YEAR).

DAYS	FIRST WEEK.			SECOND WEEK.			THIRD WEEK.			FOURTH WEEK.		
	I.	II.	III.	I.	II.	III.	I.	II.	III.	I.	II.	III.
MONDAY	The Summary Register and how to keep it	Analyse (and Parse difficult words of) Lines 144 to 152 of 'Lay of Last Minstrel,' Canto III., *or* Lines 164 to 168 of Scene 2, Act I., 'King Lear'	Euclid, Definitions of Book V., *or* Print Patch	School Premises. — Warming, Colouring, Lighting	Paraphrase Lines 356 to 369 of 'Lay of Last Minstrel, Canto V. *or* Lines 166 to 178 of Scene 4, Act II., of 'King Lear'	Deductions upon Euclid, Book IV., *or* Diagram of a Boy's Shirt	Notes of a Dictation Lesson to Standard VI.	Analyse and Parse from Bacon's Second Essay, *or* Lines 56 to 67 of Scene 7, Act III., 'King Lear'	Euclid, Book IV., *or* Linen Patch	Organisation of Mixed School of 100 average	Paraphrase Lines 156 to 166 of Scene 5, Act III., 'King Lear'	Permutations and Combinations, *or* Expenses of Clothing
TUESDAY	Dates from 1624 to 1702, *or* from 1802 to 1810	Insurance	As in First Year, *or* Geography of Quebec and Ontario	Dates from 1702 to 1760, *or* from 1789 to 1802	Stocks	As in First Year, *or* General Political Geography of United States	History from 1815 to 1860 *or* from 1815 to 1820,	Discount	As in First Year, *or* General Political Geography of United States	Dates from 1760 to 1815, *or* Constitutional Changes from 1789 to 1820	Read Bacon's Essays, *or* Denifitions of Arithmetical Terms	As in First Year, *or* Geography of Manitoba and N.W. Territories
WEDNESDAY	Repetition Penmanship, etc.	Binomial Theorem *or* Choice of Food	The Process of Reasoning	Binomial Theorem *or* How to spend a limited weekly income	Repetition, Penmanship, etc.	Contents of Acts I. and II. of 'King Lear'	Logarithms *or* Investments	Stocks	'King Lear,' Acts III. and IV., *or* Trench	'Lay of Last Minstrel,' *or* Trench	Ratio and Proportion, *or* Investments	As in First Year *or* General Physical Geography of Mexico
THURSDAY	History from 1660 to 1688, *or* from 1789 to 1802	Stocks	As in First Year, *or* Maps of Quebec and Ontario	History from 1688 to 1702 *or* from 1802 to 1814	Race Problems, *or* Notes of Lessons on 'The Chemistry of Cooking,' and 'Neatness in Dress'	As in First Year, *or* Geography of Nova Scotia and New Brunswick	Revise the Literature of the Periods	Miscellaneous Arithmetical Problems, *or* Trench	As in First Year, *or* Maps of Manitoba and N.W. Territories	History from 1461 to 1688 *or* Industrial Conditions from 1789 to 1820	Compound Interest	As in First Year, *or* Geography of British Columbia and Vancouver I.
FRIDAY	Binomial Theorem, *or* Beverages for sick	Euclid, Book VI., Props. 1, 2, 3, *or* Diagram of a Boy's Shirt	Composition on 'Jesters do oft prove prophets'	Logarithms, *or* Cooking ordinary flesh meat	Definitions of Euclid, Book VI. Props. A, 4, 5, 6, *or* Cutting out in Paper a Boy's Shirt	Analyse (and Parse difficult words of) Lines 1 to 9 of Bacon's First Essay, *or* Lines 30 to 36 of Scene 2, Act IV., 'King Lear'	Logarithms, *or* Duties of a Housemaid	Deductions upon Euclid, Book III., *or* Diagram of a Child's Muslin Pinafore	Analyse (and parse difficult words of) Lines 15 to 24 of Scene 3, Act IV., 'King Lear'	Surds *or* Economy of Food	Euclid, Book VI., Props. 7 to 11, *or* Diagram of a Child's Muslin Pinafore	Write a Life of Shakespeare *or* Trench
SATURDAY	Formation of Habits and Character	Music—Value of Notes and Rests, *or* All the Measures in common use	Examination	Health of Scholars and Teachers	Music—Signatures of the Compound Times, *or* Division of Pulses into thirds and quarters	Examination	Spencer, *or* Locke	Music—Accent, Syncopation, and Contents of Bars and Measures	Examination	The Admission Register, and How to keep it	Music—Transcription from one Time to Another	Examination

CERTIFICATE ROUTINE FOR OCTOBER, 1892 (MEN AND WOMEN, FIRST YEAR).

CERTIFICATE ROUTINE FOR OCTOBER, 1892 (MEN AND WOMEN, FIRST YEAR).

DAYS	FIRST WEEK			SECOND WEEK.			THIRD WEEK.			FOURTH WEEK.		
	I.	II.	III.	I.	II.	III.	I.	II.	III.	I.	II.	III.
MONDAY	Training of the Ear	Read Bacon's Essays, 29, 30, 31, 32, *or* 'Burke's Reflections,' pp. 255 to 280	Euclid, Book III., Props. 1 to 19, *or* Repairing Underclothing	General Principles of Teaching	Language of Bacon *or* 'Burke's Reflections' pp. 3 to 67	Euclid, Book III., Props. 19 to 37, *or* Diagram of an Infant's Shirt	Cultivation of the Intelligence	Language and Life of Bacon *or* the Poems of Wordsworth	Euclid, Book I., Props. 1 to 26, *or* Any Needlework	Training of the Voice	Parsing and Analysis from Essay V. *or* Lines 16 to 24 of 'Ode on Immortality'	Euclid, Book II., *or* Organs of Respiration
TUESDAY	Chief Dates from 1624 to 1702	Problems involving Simple Equations, *or* Construction of the House	Geography of Australia *or* Cape Colony	Chief Dates from 1702 to 1760	Stocks, *or* Compound Interest	Geography of New Zealand *or* Natal and the Transvaal	History from 1642 to 1660, *or* Revision	Evolution of Algebra, *or* Cleanliness of the Home	British Settlements in Africa	Chief Dates from 1760 to 1815	Equation of Payments *or* Stocks	Recent extensions of British Territory in South Africa
WEDNESDAY	Compound Interest	History from 1642 to 1688	Sequence of Intellectual Development	Exchange *or* Theory of Proportion	Simultaneous Equations of one degree, *or* Warming the House	Study Grammar from Text book	Stocks, *or* Compound Proportion	Simultaneous Quadratics, *or* Composition of Air	Euclid, Book I., Props 27 to 48, *or* Cutting-out of an Infant's Shirt	Averages	Problems involving Simultaneous Equations of one Degree, *or* Ventilation	Revise Geography of Hindostan *or* British Africa
THURSDAY	History from 1660 to 1688, *or* Revision	Problems involving Quadratic Equations, *or* Furnishing of the House	Map of Ireland *or* Cape Colony	History from 1688 to 1702 *or* Revision	Involution of Algebra, *or* Lighting the House	Geography of British North America *or* Natal and the Transvaal	Tables of the Stuart and Hanoverian Dynasties	Present Worth, *or* Simple Proportion	Map of Hindostan, *or* British Possessions in South Africa	History from 1688 to 1727	Mixtures, *or* Theory of Interest	Revise Geography of British Africa, *or* The African River Systems
FRIDAY	Repetition, Penmanship, etc.	Deductions of Euclid, Book I., *or* Diagram of an Infant's Shirt	Parse and Analyse from Essay XXV., *or* Lines 110 to 124 of 'Ode on Immortality'	Constitutional Changes and Literature of the Period *or* Chief English Poets	Deductions on Euclid, Book II., *or* Cutting-out of an Infant's Shirt	Write a Life of Bacon *or* Wordsworth	Any Revision of School Management	Deductions on Euclid, Book III., 23 to 37, *or* Any Needlework	Write Notes of a Lesson as for Stand. VI. upon passages given in Routine	Simultaneous Quadratic Problems, *or* Respiration	Deductions on Euclid, Book III., *or* Questions on Needlework	Give in good English the contents of Essay 32, *or* 'Resolution and Independence'
SATURDAY	Notes of a Writing Lesson to Standard II.	Music—Value of Notes and Rests, *or* Pulses and Accents	Examination	How to teach Spelling	Music—Signatures of the *Simple* Times, *or* Two, Three, and Four Pulse Measures	Examination	Repetition, Penmanship, etc.	Music—Accent and contents of Bars, *or* Continuations, Rests, etc.	Examination	Sequence of Intellectual Development	Music—Transcription from one time to another	Examination

18. (*Men only.*) Show that if $\frac{ay - bx}{c} = \frac{cx - az}{b} = \frac{bz - cy}{a}$, then $\frac{x}{a} = \frac{y}{b} = \frac{z}{c}$.

(*Women only.*) Write down any instructions you have received for your future guidance in laundry work. What apparatus would be useful for a teacher to assist her in washing her finer things?

19. (*Men only.*) Write out Euclid I. 40.

If the straight line joining the middle points of two opposite sides of a quadrilateral bisect it, show that the two bisected sides are parallel.

(*Women only.*) Find the gross rental of a man who, after paying an income-tax of 7d. in the £ and a poor-rate of 3d. in the £, has £307 18s. 3d. left. Ans. £321 6s.

20. (*Men only.*) Write out Euclid III. 35.

State and prove the converse of this theorem.

FOURTH WEEK OF MONTH.

1. Write in large hand '*Typically Unrighteous.*'

Write in small hand '*The Conquest of England.*'

2. Write from Dictation :—

'Men of a widely different description, men who redeemed great infirmities and errors by sincerity, disinterestedness, energy and courage, men who, with many of the vices of revolutionary chiefs and of polemic divines, united some of the highest qualities of Apostles, were the real directors. They might be violent in innovation, and scurrilous in controversy. They might sometimes act with inexcusable severity towards opponents, and sometimes connive disreputably at the vices of powerful allies: but fear was not in them; nor hypocrisy, nor avarice, nor any petty selfishness.'—*Macaulay's Essays.*

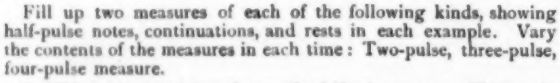
3. At what point in your teaching of Arithmetic would you introduce Rules, and require them to be learned? Give a sketch of a Model Lesson on '*Division by Factors,*' showing when and how you would teach the rule for that operation.

4. What is meant by the '*Law of Habit*'? Explain how the study and operation of this law are matters of practical importance to teachers who have charge of schools.

5. State the key of each of the following passages :—

Fill up two measures of each of the following kinds, showing half-pulse notes, continuations, and rests in each example. Vary the contents of the measures in each time: Two-pulse, three-pulse, four-pulse measure.

6. Write rests equal in value to the following notes. Write only one rest in each bar, and use dotted notes if necessary.



Write figures over the following to indicate the value (as one-pulse, half-pulse, one-and-a-half, etc.), of each note and rest :—

n : r, n .f | s : .l, s	r .n : f. | s : .s, f
l,, d : f | n :	r : — | — : s
— : —· | .f : n .r	r, d .r : n | — : —

7. A Factitive Verb in its Active form has two completions: (*a*) A word in the objective case; (*b*) Another word in the objective case, or an adjective, or an infinitive. Give an example of each kind; and express the same thought in the Passive form.

8. Analyse the following passages and parse the italicised words :—

(*Men only.*) 'Their chief use for delight is in privateness and *retiring;* for ornament, is in discourse; and *for* ability, is in the judgment and disposition of business; *for* expert men *can execute,* and *perhaps* judge of particulars, *one* by one; but the general counsels, and the plots and *marshalling* of affairs, come *best* from those *that* are *learned.*'

(*Women only.*)

'*Serene* will be our days and *bright,*
And happy will our nature *be,*
When love is an *unerring* light,
And joy its *own security.*
And they a blissful *course* may *hold,*
Even now, who, not unwisely *bold,*
Live in the spirit of this creed;
Yet seek thy firm support according to *their* need.'

9. What are the principal causes determining climate? Apply your explanation to the climate of Cape Colony.

10. (*Men only.*) A person starts from Calcutta in a ship for Melbourne, and stops at every English Possession in the Malay Peninsula, and the islands to its south. Where does he touch? Mention any things of interest that he would see.

(*Women only.*) What are the chief products of Egypt and British South Africa? Indicate for each product the district or districts where it is most abundant, and describe the natural conditions on which its production depends.

11. What expansion of our Indian Empire took place between 1848 and 1856? What change was made in the Government of India subsequent to the Mutiny? State clearly the importance to England of the Suez Canal.

12. (*Men only.*) Give some account of Strafford and Laud, and their plans for making the Crown absolute for Church and State.

(*Women only.*) Give the principal provisions of Magna Charta, The Petition of Right, and the Declaration of Right, and narrate briefly, with dates, the events immediately preceding each.

13. A vessel steams 16 knots per hour. How many metres per second is this equal to, taking 1 metre as 3·2809 feet, and 1 knot as 6086·5 ft.? Ans. 8·24502.

14. (*Men only.*) A person buys five shares in a concern at 40. Next year the price is 45, and every succeeding year there is a fall of 4. Each year he sells out one share, and finds that at the end he has neither gained nor lost. What interest did the concern pay? Ans. £1 per share.

(*Women only.*) A sets out from a certain place, and walks at the rate of $3\frac{3}{4}$ miles per hour. B follows on horseback twenty minutes later, at the rate of $8\frac{1}{2}$ miles an hour. How soon will he overtake A? Ans. $15\frac{1}{8}$ mins.

15. (*Men only.*) If the two adjacent sides of a parellelogram be 7 ft. and 10 ft. and one of the angles 120°, find its area.

Ans. $35\sqrt{3}$ sq. ft.

(*Women only.*) Give directions for sewing on a button and making a button-hole.

16. (*Men only.*) Find the area of the square inscribed in the semicircle whose radius is 8 feet. Ans. $51\frac{1}{4}$ sq. ft.

(*Women only.*) Say how far each of the following may be useful or objectionable in laundry work: Borax, soap, hot water, lukewarm water, soda, bran and ox-gall.

17. (*Men only.*) A and B have made a bet; the money which A stakes bears the same proportion to all the money A has, as all the money B stakes bears to all the money B has. If A wins he will have double what B will have, but if he lose B will have three times what A will have. All the money between them being £168, determine the circumstances.

Ans. A has £72, B has £96; A stakes £30, B stakes £40.

(*Women only.*) Give a description of the lungs and their functions, describing the way in which the health is affected by breathing impure or exhausted air.

18. (*Men only.*) If one quantity vary directly as another, and the former be $\frac{2}{3}$ when the latter is $\frac{4}{5}$, find what the latter will be when the former is 9. Ans. 16.

(*Women only.*) State the different ways in which potatoes may be cooked by themselves and with other vegetables.

19. (*Men only.*) Write out Euclid II. 6.

In any trapezoid the squares on the diagonals are together equal to the squares on the non-parallel sides together with twice the rectangle contained by the parallel sides.

(*Women only.*) $\dfrac{3}{8 - \frac{7}{2 - \frac{3}{4}}} + \dfrac{5}{6 - \frac{5}{2 - \frac{5}{6}}}$ Ans. $4\frac{1}{13}$.

20. (*Men only.*) Write out Euclid III. 36.

If two circles intersect prove that tangents drawn to them from any point of their common chord produced are equal to each other.

SECOND YEAR.

SECOND WEEK OF MONTH.

1. As in First Year.

2. As in First Year.

3. Write out some short directions to be observed by a pupil-teacher in drawing up Notes of Lessons.

(*a*) As to the use of a text-book.
(*b*) The amount of matter.
(*c*) The aids to memory.
(*d*) The appeal to the reasoning powers.

4. Spencer says: '*Hence it follows that Biology and Psychology are indispensable as interpreters of Sociology.*' Explain how this dogma has been arrived at; OR,

Summarise Locke's remarks upon '*The advantages of society and the improvements which are to be made by ingenious company.*'

5. What means would you adopt to get rid of flat singing in a class of children?

6. As in First Year.

7. (*Men only.*) Give some account of what Bacon says of '*Adversity*,' showing how his own life illustrates any of his arguments; or of '*Ambition.*'

(*Women only.*) Criticise the terms Semitic, Indo-European, Gothic, as applied to languages.

8. Give an account of your own impression after reading 'King Lear,' with especial reference to the style and the author's use of language.

9. (*Men only.*) As in First Year.

(*Women only.*) Compare the numbers of the population north and south of the dividing line between the United States and Canada, and account for the difference.

10. (*Men only*). As in First Year.

(*Women only.*) Describe the chief occupations of people in the province of Manitoba, and the conditions under which their industry is carried on.

11. (*Men only.*) As in First Year.

(*Women only.*) What important inventions were made during the latter portion of the 18th century? Show that during the century the locality of some of the chief seats of manufacturing industry in England was changed.

12. (*Men only*). As in First Year.

(*Women only*). What was the main provision of Fox's Libel Bill? Mention any trials in which this alteration of the law proved of great importance.

13. (*Men only.*) Find the principal which will amount at compound interest in two years to £739 7s. 6d., and in three years to £768 19s. Ans. £683 11s. 10½d.

(*Women only.*) What numbers of 4 digits each can have 119 as their G.C.M. and 13923 as their L.C.M.? Ans. 1071 ; 1547.

14. As for First Year (*Men*).

15. (*Men only.*) As in First Year.

(*Women only.*) Cut out in paper the right half of a child's muslin pinafore.

16. (*Men only.*) If from a cone of 4 feet radius, and 10 feet in altitude, the upper 4 feet are cut away, what is the solid content of the remaining frustrum? Ans. 156·8286 c. ft.

(*Women only.*) Name several economical dinners for a man, his wife, and three young children, with the probable cost of each meal.

17. (*Men only.*) Find the amount of an annuity left unpaid for any number of years, allowing simple interest upon each sum from the time it becomes due.

Ans. $n\,A + \frac{n\,(n-1)}{2}\,r\,A$, where A = annuity, n = number of years, r = interest of £1 for one year.

(*Women only.*) Explain the meaning of the following terms:—*Insurance, Cash Prices, Bonus, Co-operative Societies, Provident Societies, Consols, Railway Stock.*

18. (*Men only.*) Divide unity into four parts in Arithmetical Progression, of which the sum of the cubes shall be $\frac{1}{10}$.

Ans. $\frac{1}{10}, \frac{2}{10}, \frac{3}{10}, \frac{4}{10}$.

(*Women only.*) Give good receipts for making beef-tea and barley-water. Name other simple beverages suitable for convalescents. Describe in detail how you 'make tea.'

19. (*Men only.*) As in First Year.

(*Women only.*) Find the present worth of £1,000 due 100 days hence at 10 per cent. per annum. Ans. £973 6s. 8d.

20. (*Men only.*) Write out Euclid IV. 10—
Describe an isosceles triangle having the vertical angle three times each of the base angles.

FOURTH WEEK OF MONTH.

1. As in First Year.

2. As in First Year.

3. What are the chief 'Laws of Association'? How could you utilise them in a Geographical Lesson?

4. Draw up a Time-table for a week for the highest class of a school in which two Class subjects are taken, specifying at the foot your reasons for assigning to the closing hours of morning and evening school the special lessons you have selected for those hours.

5. As in First Year.

6. State the average compass of Trebles (children), Altos (children), Tenors, and Basses.

7. Say what is the meaning and origin of the following words and how Shakespeare uses them:—

Fordone, Perdu, Che vor ye, Handy-dandy, Questrists, and *Civet.*

8. (*Men only.*) Say in what connection these passages stand, and what part they play respectively in Bacon's argument:—

(*a*) 'Truth will not rise to the price of a diamond or carbuncle.'
(*b*) 'Some books also may be read by deputy.'
(*c*) 'Fear pre-occupateth Death.'
(*d*) 'Late learners cannot so well take the ply.'

(*Women only.*)—

(*a*) 'Renaissance is another question-begging word.'
(*b*) 'The same faith in the influence of the stars survives in....'
(*c*) 'A name will embody and give permanence to an error.'
(*d*) 'Nobody heard of "*extradition*" till within the last few years.'

9. (*Men only.*) As in First Year.

(*Women only.*) Describe the principal American rivers flowing into the Arctic Ocean. What do you know of Alaska?

10. (*Men only.*) As in First Year.

(*Women only.*) Give an account of (*a*) the Cañons of the Colorado, (*b*) the Great Salt Lake District, (*c*) the Peninsula of Labrador, and (*d*) the vegetation of Florida.

11. (*Men only.*) As in First Year.

(*Women only.*) What reforms are associated with the names of Romilly, Howard, and Clarkson? Give an account of any of these.

12. (*Men only.*) As in First Year.

(*Women only.*) What disasters befell our arms between 1806 and 1815? Give particulars of any one of them.

13. As in First Year.

14. As in First Year.

15. (*Men only.*) As in First Year.

(*Women only.*) Cut out and tack together one arm of a boy's shirt, and show the stitches required in making up the garment.

16. (*Men only.*) A cone revolves on a circular plane of 5 feet radius, with its vertex in the centre. If in making the entire circuit of the circle it revolves 5 times, find the height of the cone.

Ans. 4·898 ft.

(*Women only.*) Point out the value of fish as an article of diet, and describe the different methods of cooking herring, mackerel, and cod.

17. (*Men only.*) Write down the 9th term of

$$\left(\frac{3x}{4} - \frac{2y}{3}\right)^{10}. \qquad \text{Ans. } \frac{2145}{64}x^7y^2.$$

(*Women only.*) Where would you do your marketing? How would you choose fish, and how would you know whether meat is fresh and of good quality?

18. (*Men only.*) As in First Year.

(*Women only.*) Tell what you know of raisins, figs, prunes, and dried currants. Whence do they come, how are they prepared for market, and what is their use and value as food?

19. (*Men only.*) Write out Euclid VI. 8.

What is the connection between this proposition and Euclid VI. 13, Euclid II. 14, Euclid III. 31, and Euclid III. 35, Case 2?

(*Women only.*) Simplify

$$\frac{\sqrt{25{\cdot}4016} - \sqrt{1{\cdot}0609}}{\sqrt{25{\cdot}4016} + \sqrt{1{\cdot}0609}} \qquad \text{Ans. } \frac{401}{607}.$$

20. (*Men only.*) As in First Year.

CORRESPONDENCE.

We shall be pleased to reply briefly and through these columns to anyone seeking examinational information and advice.

This privilege does not, of course, extend to furnishing the solutions and answers of problems. All such communications should be addressed to 'THE QUERY EDITOR.'

Replies demanding urgency will be promptly forwarded per post on receipt of a stamped and addressed envelope. A post will be saved by writing direct to DR. GEORGE BEACH, M.A. (*Examination Editor of 'Practical Teacher'*), STANLEY MOUNT, MACCLESFIELD.

H. L. (Builth).—Selby's 'Burke's Reflections,' Published by Macmillan, 4s. 6d.

S. O. N. (Selby)—Apply for the Second Class 'D.'

TAM (Dundee).—Heller's Code, price 1s., Bemrose and Son.

'A.' (Ayr).—Dr. Ross, Training College, New City Road, Glasgow.

J. F. (Douglas).—Send on stamped envelope and we will reply *seriatim*.

J. T. G. (Perth, West Australia).—A. Berry, Esq., Syndicate Buildings, Cambridge.

J. McL. (Rathmines, Dublin).—Overend's Physiology, Gregory's Physiography, Guthrie's and Ferguson's Electricity from any scholastic booksellers. McGee, Nassau Street, would get them.

S. P. Q. R. (Cockermouth).—The present method of selecting inspectors is a relic of the barbarism of caste.

J. A. R. (Berwick).—French and History cannot form a group.

J. P. (Lonsdale), TOM (Borough Road T.C.), ELSIE (Halifax). All the Antitheta have now been published.

S. W. (Stockport).—A Pupil Teacher cannot be apprenticed to an Evening School.

T. U. F. (Torquay). Yes, Exeter would suit your purpose.

H. B. (Moor Row, Carnforth).—So few take Greek that we are afraid we shall not be able to comply with your request.

A. E. H. (Northampton).—Correspondence of Lord Malmesbury, Lord Auckland, Mr. Rose, and Lord Cornwallis; Memoirs of Fox and Romilly; Napier's History of the Peninsular War.

E. K. (Ecclesford).—You can certainly try once more at Scholarship.

G. V. (Holsworth, N. Devon).—Please return list.

DEMANDER (Luton).—Its omission from the Time Table will not affect your choice.

REGULAR SUBSCRIBER (Aberdare).—Write to Clive & Co., 12½, Booksellers' Row, Strand, London, E.C., for Matriculation Guide, No. XII.

PUZZLED (Boston.)—A second class 'D.'

C. C. U. (Hammersmith).—Matriculate during residence.

FABIOLA (Townhead, Glasgow).—Write to W. W. Beach, Esq., The Academy, Institute Buildings, Crewe, who will be happy to put you on the right track for a Royal Irish Degree, which appears to me most suited to you.

S. S. (Heligoland).—There will be no objection if you comply with codal conditions.

W. S. C. (Hull).—In next issue will appear a full list of the books advised to be purchased. Read the P. T. articles in our back numbers, and you will find good selections of novels, etc., which will not only add to your literary knowledge, but do also actually bear directly upon your work.

NIMROD (Newport, Salop).—Not for Second Class 'D,' but it would be necessary for First Class.

ANSWERED PER ORDINARY LETTER.

A. W. (Rushden), A. E. J. (Fratton), M. G. C. (Uxbridge), T. J. S. (Runcorn), M. J. (Pontypridd), J. P. M. (Kilsyth), J. A. (Tailbach), G. N. A. (Long Eaton), J. F. B. (Reading), J. T. (Claughton-on-Brock), J. F. (Oxford), T. W. S. (Lancaster), T. L. (Kynpersley), J. F. (Jarrow), J. W. A. (Stockport), O. W. S. (Attenborough), 'J. W. E. (Pimlico),' W. J. T. (Bideford), J. B. (Walkden), L. E. (Castleford), J. T. (Ulphas), A. M. (Kentish Road), W. H. T. P. (Southsea), R. N. W, (New Shildon), J. D. (Cheetham Hill), J. H. W. (King's Langley), L. T. (Leighton Buzzard), A. R. H. (Folkestone), D. A. (Congleton), T. G. (Harwich), J. E. M. (Braithwaite), I. D. (Neath), A. R. I. (Portsmouth), M. D. D. (Rotherham), H. J. H. (Somer's Road), G. V. (Holsworth), J. W. G. (Bethesda), J. P. K. (Bromborough), J. D. D. (Chester-le-Street), K. J. B. (Malmesbury), U. K. S. (Macclesfield), O. A. (Rochdale), H. M. (Gomersal), P. P. (Lichfield), T. U. N. (Rochester), J. T. (Garstang), F. J. (Stourbridge), W. M. (Exmouth), J. O. (South Shields), F. W. C. (Southport), H. N. (Rotherham), W. L. (Newbridge), W. L. H. (Cambridge), W. W. (Salisbury), M. A. A. (Dumbryden, Midlothian), A. S. (Bollington).

NOTES AND NOTIONS.

BY RICHARD WADDINGTON,

President of the Half-time Council of Teachers.

HERE are a couple of interesting letters acknowledging the receipt of copies of the pamphlet on 'Age and Attendance,' issued by the Executive.

Privy Council Office,
August 26th, 1892.

DEAR SIR,—Many thanks for the pamphlet. I am very glad to know the views of the teachers on so difficult a question. They shall have my best attention. With sincere thanks for your kind wishes,

Yours very truly,
A. H. D. ACLAND.

Education Department, Whitehall.
July 17th, 1892.

DEAR SIR,—I am much obliged for the pamphlet which you have been good enough to send to me, and I have read it with much interest.

You will not, of course, expect me to express any opinion upon its contents, but I may say that the subjects with which it deals are constantly and necessarily under my observation.

I am,
Yours faithfully,
R. WADDINGTON Esq. G. W. KEKEWICH.

• • • • •

THE report of the superintendent of Factory Inspectors contains a formidable list of accidents to young children in mills. It would be safe to say that not half the cases reach the Home Office.

A typical case came before the Ashton magistrates last week. Mr. C. P. Vaughan, Factory Inspector, said the defendant was a self-actor minder, working at Lee's Union Mills, and on the 9th of June the child James Bagnall, who worked for him as a little piecer, was cleaning one of the carriage wheels when the carriage ran over his finger, inflicting certain injuries to the finger. The prosecution was taken out under the 9th section of the Act, which drew the distinction that a half-time child under 13 might not clean any portion of the machinery whilst the same was in motion. *He was sorry to say that cases of this kind were reported to him not infrequently.* Defendant fined 2s. 6d. and costs.

My own experience agrees with the Inspector's—it is the too common practice to allow these little children to run all manner of risks.

• • • • •

FROM the report of Mr. Watkins, H.M.I. for the North-Western District, published in the Blue Book for 1846, I gather the following as the ideal expenditure for a school of eighty children :—

	£	s.	d.	
One Teacher	45	0	0	per annum.
Assistant	15	0	0	"
Repairs	2	0	0	"
Books	3	0	0	"
Furniture and apparatus	1	10	0	"
Lighting and warming	3	0	0	"
Other expenses ...	5	0	0	"
	£74	10	0	

CAN you be surprised to find the Inspector reporting on one school that does not reach even this miserable annual expenditure? 'There are four classes (so-called) of boys and girls together, under an untrained and ignorant master, who seems to know little about his duties'?

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THE question of extraneous duties seems to have been o'ershadowed by the report of the Select Committee on Superannuation. This is an opportune moment for pressing the question once more at Whitehall. Here is a specimen of the village pedagogue:—

> Remote from towns, he ran his godly race,
> Nor e'er had changed, nor wished to change, his place.

In addition to teaching the whole of the standards, while his wife struggles on with the infants, he

1st. Sweeps and cleans the school.
2nd. Rings the church bell for service.
3rd. Acts as clerk, thus having to attend all marriages, funerals, and baptisms.
4th. As sexton has to dig all graves, etc.

This is no fairy tale, for only the other week he might have been seen grave digging. How a trained and certificated teacher can so far forget his duty to his neighbour passes my comprehension, until I am reminded that this school-cleaning, grave-digging, bell-pulling, clerical factotum is not a member of the N.U.T.

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THERE is no burking the fact that teachers—more especially male assistants—are less plentiful than they were two or three years ago. The result is that the starvation salaries are fast disappearing. The position of the assistant has been a very unsatisfactory one for many years. There has been an unaccountable timidity among the assistants in asserting their just demands. The miserable pittances doled out to these duly-qualified and trained teachers in the shape of salaries would have increased long ago if the assistants had had courage to make the press the means of enlightening the public. Some years ago a first-class trained certificated assistant was offered £45 per annum by the School Board of a large and important borough. Can you wonder that this same School Board is paying £30 per annum to first year pupil teachers? This same School Board pays its attendance officers 32s. per week, and the superintendent of the attendance officers £200 per annum.

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HERE is another School Board which pays its school cleaners better than its school teachers. This School Board has a fixed amount per head to spend on salaries. No matter how efficient, or lengthy the service, no increase can come to the assistant if the amount allowed per head would be exceeded. To meet the requirement of the seventeen and sixpenny limit all sorts of financial manœuvres are practised. In one case the school-yard was flagged, although the asphalt was in tolerably good condition, in order to spend the necessary amount; and yet, in that very school, there were assistants who had been refused the annual increase because the amount per head would be exceeded.

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THE 'scale of salaries' under most Boards fixes a maximum salary. How many reach this maximum? Judging by the progress I see around me I anticipate there is more likelihood of the average assistant being superannuated than paid on the maximum scale, especially when I remember that under the Manchester School Board there is at least one trained, first-class certificated assistant receiving £60 per annum, after waiting eighteen months to be placed on the scale.

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AND this brings me to another pressing question. How are the managers of our poorer schools attempting to meet the difficulty of supplying their schools with cheap teaching power? Women teachers are being brought into even boys' schools, because they are cheaper. In mixed schools the male assistant is gradually disappearing in most of the voluntary and more economical School Board schools. I don't mind this when it is done purely on educational grounds. But if a woman does the same work as a man she surely ought to have the same pay. Herein is the crux of the question, and it is fully time some action be taken to secure equal pay for similar work for men and women. Too often the wife of the schoolmaster is a kind of make-weight thrown in, *without salary*, to take the infants or sewing.

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Scene: A primary school.

Teacher (examining a newly-joined pupil).—'What's your name?'
Child.—'I dun'no.'
Teacher.—'Where do you come from?'
Child.—'I dun'no.'
Teacher.—'Have you ever been at school before?'
Child (with a gleam of intelligence).—'Yes.'
Teacher.—'Was it a Board School?'
Child.—'No; brick.'

• • • • •

ONE thing, at least, I anticipate the change of Government will secure—the maintenance of the requirement of increased staff in our schools. Notwithstanding Sir William's good intentions in this matter, there was always the danger that clerical pressure would succeed in squeezing a retrogressive acquiescence to either a lowering of the amount or the quality of the teaching power required to satisfy the minimum requirements of the Department.

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IN the course of an article dealing with the alterations that came into effect on September 1st last, the *School Guardian* says:—

'From September 1st the "Duplicate Schedule" has ceased to be given to managers by Her Majesty's Inspector. *For the future individual results must be obtained from the Organising Visitor's Schedule.*'

The italics are mine. I gather from this that the passing or failing a particular examination is to still fetter the teacher's more intimate, and therefore more correct judgment. Is this the boasted freedom of classification the teachers fought for? Is not the opinion of the teacher who daily notes the progress worth all the schedules in the universe in properly classifying the scholar? I understand that under some School Boards the classification is taken out of the hands of the teachers. What a high and mighty opinion the visitor must have of his ability, when by one or two visits he is supposed to be better able to classify the scholars than the teacher who is in contact with them every day! Teachers, the Schedules are discontinued because the department can trust

you! See that your judgment is not fettered by the leading strings of the organising visitor.

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THE 'funny man' of the Science and Art Department has evidently returned from his holidays. This is his latest joke. Teachers of classes or schools under the control of a local authority under the Technical Instruction Act may earn grants from the Department without any specific qualifications at all. The ink is hardly dry on the regulation which took away from the holders of second class advanced certificates the power to earn grants. Practically, I can earn grants for all the 'ologies' and 'isms' of the Science and Art Directory if my school is under the Local Authority; but, if not, I cannot earn grant on the elementary stage if I only hold a second class advanced in the subject. Truly the Science and Art Department must be fearfully and wonderfully managed.

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FROM Mr. Scott Coward's report for 1891 on the North-Western Division I extract the following very forcible remarks anent 'age and attendance' as the qualifications for labour :—

'The best remedy for much of this would be the adoption of the age and attendance qualification instead of the present one. The requirement of regular attendance in a public elementary school during several years of a child's life as the condition of earning the privilege of going to work would be much more effectual in improving the attendance in our schools. Under the existing system the object is to pass the examination prescribed for the standard of exemption. To do this it is thought to suffice to condense regularity of attendance and the effort of preparation within the compass of a few weeks. But of what value is such an effort? What real knowledge is gained? What habits of mind acquired that can stand as a strong foundation upon which to build up a thoughtful, well-balanced character? Make regular attendance at an efficient public school the test of fitness to enter upon the labour of life, and you will secure for the child the surest path to an education worthy of the name, and you will add the most powerful stimulus to the parent to send his children to school. The steady, continued application which it would entail would make the learning acquired more fruitful and abiding than the mere cram which the present system now encourages.'

'The gain to education at large would also be considerable, for by dealing a final blow to preparation for individual examination, which often is resolved into a narrow drill, a wider scope would be given to the instruction, and more freshness and originality imported into the methods of our schools. . . . .

'All my colleagues whom I have consulted, and who are specially qualified by personal knowledge to speak, are in accord with me on this important matter.'

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I HAVE been reading *Arcady*, and here is Dr. Jessopp's description of elementary education :—

'The elementary education afforded in our village schools is, at the best, a useful method of keeping children amused for so many hours a day, and getting them in the *way of working out puzzles*. By far the most profitable—financially profitable—subject which a school can take up for the annual examination, on the results of which the very existence of most of our schools depend, is the subject of Grammar. By far the least popular—because the least *paying*—subject is History. I am not the man to speak with disrespect of grammar. I have myself been guilty of the wickedness of publishing an elementary book on Greek Accidence, and, of course, I hold it to be beyond compare the best book on the subject extant. But to teach grammar as an abstract science, to torture little ploughboys with subject and object, predicate and epithet,

> Till over the adverbs they fall asleep
> And parse away in a dream;

to possess them with the horrid conviction that grammar is not a means to an end, but the end itself—that seems to me about as wise as if a man should boil his spade and eat it, because under certain circumstances that spade may be used to dig up a potato.

I once caught some melancholy children at a certain elementary school engaged in a grammar lesson, and, shocked at the morne and sombre aspect of affairs, I desperately interpolated an altogether extraneous question.

'Little girl—*that's* all right—but what do you know of Admiral Nelson?'

'Please, sir, we only do nouns and adjectives,' was the prompt reply. 'We have not got into verbs.'

I thought of Humpty Dumpty's profound remark :—'They've a temper, some of them—particularly verbs; they're the proudest—adjectives you can do anything with, but not verbs!'

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SCHOOL Magazines are, as a rule, not very long livers but I must congratulate the Editor of the Cheltenham Parish Church Boys' School Magazine on the issue of the 69th number. It is not every school that can run a magazine devoted entirely to school matters, but at Cheltenham they even issue—double numbers.

RECENT INSPECTION OF A LONDON BOARD SCHOOL.

THE date of the inspection was fixed at a convenient time in July, so that it was well over for the Summer holidays. On the appointed day the Inspector and his Assistant appeared shortly after nine o'clock, and both immediately set to work on the two lower standards, and those above the third. The method of examining by sample was adopted throughout. The children of each standard having been previously arranged according to letters A, B, C, in successive threes on the schedules, the Inspector determined which section should be examined in Reading, which in Writing, and which in Arithmetic. The work then proceeded very rapidly, and Standard I. was soon done with for Arithmetic and Transcription. The section for Reading was heard while Standard II. were doing their paper work. In order that none of the latter should be sitting idle, those who had to read were told to write from memory some portion of the poetry

prepared for recitation. A similar plan was adopted in the upper standards. It is attended with some drawback, for when reading and dictation are going on in the same room with arithmetic the effect is apt to be somewhat distracting to some of the children. The matter, however, was managed smoothly, and so the objection was minimised. A more serious matter was the waiting of Standard III. till the lower standards were practically finished. Beginning at half-past eleven on the examination tests is not so favourable to hearty and careful work as when the mind is fresh and the limbs uncramped. It also involves running beyond the usual hours; but, owing to considerate management on the part of Inspector and Teacher, the delay did not tell adversely on the result.

The whole of the work in ordinary subjects was completed at the morning session of the school, as well as a considerable part of the class subjects in the lower standards.

The remaining parts of the class work, including singing, and the examination of the Upper Standards in Algebra, were taken on the following morning. The whole passed off smoothly and easily.

We proceed to give details of the tests applied to the standards arranged according to subjects.

Arithmetic.

Standard I.—The following exercises were dictated and worked on slates:—

1. Add 675, 893, 87, 9, 452.
2. From 830 take 38.
3. Take 607 from 700.

Answers.—(1) 2,116; (2) 792; (3) 93.

Standard II.—The following tests were given:—

1. Divide 79,468 by 8.
2. Multiply 9,375 by 709.
3. Multiply 86,473 by 45.
4. From 81,006 take 20,978.

Answers.—(1) 9,933 + 4; (2) 6,646,875; (3) 3,891,285; (4) 60,028.

Standard III.—Test-cards were distributed.

1. Add £37,059 17s. 6½d. + £310 1s. 10½d. + £9,502 18s. 9d. + £49 15s. 2¾d. + £4,738 14s. 11½d.
2. Divide 729,046 by 368.
3. Take nineteen thousand two hundred and ninety-nine pounds twelve shillings and elevenpence three farthings from twenty-one thousand three hundred and nine pounds six shillings and fourpence.
4. Subtract the thirteenth part of 9,438 from 26 times 382.

Answers.—(1) £51,661 8s. 4d.; (2) 1,981 + 38; (3) £2,009 13s. 4¼d.; (4) 9,206.

Standard IV.—A typical card.

1. Multiply £18 19s. 2¾d. by 97.
2. Divide £7,549 14s. 11¼d. by 79.
3. Find the cost of 34 score sheep at 37s. 6d. each.
4. How many seconds are there in a leap year?

Answers.—(1) £1,839 5s. 2¾d.; (2) £95 11s. 3¾d. + 60far.; (3) £1,275; (4) 31,622,400 seconds.

Standard V.—1. Make a bill for the following:—18 lbs. of beef at 10½d. per lb.; 7½ lbs. mutton at 8½d. per lb.; 25 lbs. mutton at 6½d. per lb.; 10¼ lbs. pork at 7d. per lb.; 100 eggs at 1s. 6d. per score.

2. Find the cost of a road 32 miles 3 furlongs in length, at £120 10s. 6d. per mile.

3. Simplify $\frac{3}{8} + \frac{7}{8} - \frac{1}{8}$.

4. A draper bought 100 yards for £20. He sold half of it at 5s. per yard, and the rest at 4s. 7½d. per yard. Find his gain.

Answers.—(1) 15s. 9d. + 5s. 3¾d. + 13s. 6½d. + 5s. 11¾d. + 7s. 6d. = £2 8s. 1d.; (2) £3,901 19s. 11¼d.; (3) $1\frac{1}{10}$.; (4) £4 1s. 3d.

Standard VI.—1. In what time will £50 amount to £125 at 2½ per cent. per annum simple interest?

2. Divide ·003 by 1·6.

3. Find the value of $\frac{7}{64}$ of £1 12s. + $\frac{1}{8}$ of $\frac{3}{8}$ of 10s. − ·75 of a crown + $\frac{1}{30}$ of 5 guineas.

4. If 12 sheep or 28 lambs eat the produce of a field in 29 days, how long will it last 12 sheep and 28 lambs?

Answers.—(1) 60 years; (2) ·001875; (3) 3s. 11½d.; (4) 14½ days.

Standard VII.—1. How much must I invest in the 4½ per cents at 94 so that my yearly income may amount to £166 10s.?

2. The average age of ten men is 58 years; the average of two of them is 45 years; the average of the next five is 50. Find the average age of the rest.

3. A house is worth £4,640. How much shall I pay for insurance at $\frac{3}{8}$ per cent.

4. A certain number divided by 8 equals $\frac{\frac{3}{5} \text{ of } 6\frac{1}{4}}{1\frac{1}{3}} - \frac{4\frac{7}{8} - 3\frac{3}{16}}{2\frac{1}{8}}$. Find the number.

Answers.—(1) £3,478; (2) 80 years; (3) £17 8s.; (4) $16\frac{187}{189}$.

Writing.

Standard I.—*Transcription*—The following passage from the reading book was transcribed on slates:—

'When we see a crab at table its shell is light red; but when it is alive it is never this colour. It turns bright red when boiled. A crab has four pairs of legs and two hands or claws. One hand is large and the other hand is small.'

'Practical Reader,' No. I., page 44.

Standard II.—*Dictation*—

'Cats are fonder of places than they are of persons. This is proved by their readiness to leave their old master and mistress, if they should happen to change houses. They are very clever in finding their way back to their old home.'

'Practical Reader,' No. II., page 93.

Standard III.—*Dictation*—

'Rob went back eager and joyous. Forthwith a thorough inspection of the boat was set about by the lads. They tested the oars, they tested the thole-pins, and they had a new piece of cork put into the bottom.

For, that evening, when it grew a little more toward dusk, they would make their first cast with the net.'

'Longman's New Reader,' III., page 87.

Standard IV.—*Dictation*—

'We are often apt to think that we are much superior to the nations of the East, but there are many things we can learn from the Japanese. They are a peaceful race, living mostly by agriculture, which they have brought to a high state of perfection. They have fine schools in every town, and believe that money spent in educating the people is one of the best investments a nation can make.'

'Longman's New Reader,' IV., pages 172-3.

Standard V.—*Dictation*—

'Hot as the weather was, the land did not seem to suffer much from drought. The forest was thick where the diggers had not destroyed it. A considerable portion of the journey lay through a continuous well-wooded park, with the richer soils enclosed and cultivated. Sheep were lying down contented in the long evening shadows; and though the air was like a furnace, it was all very pretty and peaceful.

'The Bank of England is obliged to pay all its notes in coin on demand.'

From a selection of Unseen Dictation Tests.

Standards VI. and VII.—*Composition*—The test was a short essay on a subject chosen by the boys, either an account of a General Election, or an account of a Country Holiday.

Copy-books were examined in the various standards, and words of commendation bestowed on the neatness and uniformity displayed in some of the classes. The books used below the first class were the vertical copy-books of Mr. John Jackson. His system had been introduced during the year for Standards I. to IV. It was thought that in the higher standards, where the style of writing was more completely formed, it was inadvisable to adopt a new style.

Reading.

In all the standards the reading test was taken from one of the ordinary books used in the school, and was limited to about one-third of the boys—set A, B, or C as the case might be.

English.

Standard I.—The piece prepared for recitation was 'Robin Redbreast,' by William Allingham. The questions on meanings were of a reasonable sort; as—Why is the robin called redbreast? What is meant by his breast-knot? Why are the trees called 'Indian Princes'? When are they 'ghosts'? Why? What makes the ways 'like iron'?

Questions in grammar—selecting nouns—were asked by the teacher.

Standard II.—The piece recited was 'A Night with a Wolf,' by Bayard Taylor. Some verses were given simultaneously, and others by selected individual scholars. The questions were on the general meaning of the poem, and on some of the figurative expressions. What is the pine-tree roof? What does 'belated' mean? Why did the wolf lie down by the man without attempting to hurt him?

The Inspector questioned the class on nouns and verbs, particularly on singulars and plurals.

Standard III.—The piece recited was 'Barbara Frietchie,' by Whittier. Scarcely any questions were given on the poem.

The teacher of the class was asked to put questions on personal pronouns and their uses.

Standard IV.—The class had prepared a selection from Lord Macaulay's Lay of 'Horatius.' When this had been recited, a number of questions were asked about Lars Porsena and the chief persons mentioned in the poem.

For grammar the following sentence, chosen from one of the stanzas not committed to memory, was placed on the blackboard:—

'And for a space no man came forth
To win the narrow way.'

The parsing of this was dealt with very thoroughly by questions on the relations of the words, and the use of other similar words. Thus 'to win' was used to elicit the use of the Infinitive mood, the difference between Transitive and Intransitive verbs, the governing power of the former.

Standards V. to VII.—The recitation was chosen from the 'Trial Scene' in the *Merchant of Venice*. Few questions were asked on the meaning, but the following sentence was written on the blackboard and thoroughly parsed:—

'Your wife would give you little thanks for that,
If she were by, to hear you make the offer.'

Occasion was taken to question on the Subjunctive and Infinitive moods.

Geography.

Standard I.—The questioning was left mostly to the teacher, who examined on the meaning of a map, a map of England being hung before the class for reference.

Standard II.—The Inspector examined on mountains and valleys, using a piece of paper to curve in one direction to illustrate a valley, and in the opposite to represent a watershed. Then he asked about the formation of rivers, the parts of a river—source, channel, mouth, etc. What is the land called where the sea comes up to it? What do we find on the coast or shore? (Sand.) How is sand formed? He was pleased to find some of the boys could explain the formation of sand.

What is a volcano?

Standard III.—The Inspector directed the teacher to question on the Manufactures. What is made at Wal sall? (Saddler's ironmongery.) Here the Inspector took up the examination, asking about the iron parts of harness. Then he went on to the pilchard fishery. What are pilchards like? How large are they? Where are they caught? What is St. Michael's Mount? Why is it so called?

Standard IV.—The questioning was done chiefly by the teacher on lines indicated by the Inspector. Scot-

land and North America were the parts dealt with. In connection with the great lakes, Chicago was mentioned. Then questions were put by the Inspector on the Independence of the States ; also in connection with Quebec, on the war between England and France, and on the victory of Clive in India at the same time.

Standards V. to VII.—In the first class the geography of the world had been studied. Questions were asked by the teacher on Asiatic countries—China, India, Persia ; then on Cape Colony, and the new scheme for securing British East Africa. Maps of India, South America, and Cape Colony had been prepared by the boys, and these had to be drawn from memory.

Singing.

The singing throughout the school had been taught by one teacher. As the examination, so far as it consisted of anything beyond the singing of prepared songs, included only tests of the ordinary type on the modulator and blackboard, it may possibly be of some service to insert here a copy of the list of songs prepared by the different standards, with the information marked for the teacher's guidance.

Standard I.—

1. The Sun in Sinking. Key B♭. First note, s_1. *Sch. and College Songs, p.* 29.

*2. Over the Snow. Key E. First note, m. *S. M Leaflet.*

3. Summer Song. Key G. First note, s_1. *Sch. and College Songs, p.* 21.

4. Come Soft and Lovely Evening. Key D. First note, s. *School Choir, p.* 19.

*5. Robin Redbreast. Key D. First note, s. *New Tunes. p.* 26.

Standard II.—

1. 'Tis the Rosy Morn. Key C. First note, m. *Sch. and College Songs, p.* 44.

2. Oh! the Sports of Childhood. Key D. First note, s. *Sch. and College Songs, p.* 24.

3. 'Tis the Pleasant Springtime. Key G. First note, m. *Code Music Drill, p.* 27.

*4. A Thousand Stars. Key F. First note, s. *Code Music Drill, p.* 13.

*5. If I were a Sunbeam. Key C. First note, m. *Good Songs, p.* 1.

Standard III.—

1. Cold the Blast may Blow. Key F. First note, d. *Young Voices, II., p.* 20.

2. The Crystal Spring. Key C. First note, s. *Young Voices, II., p.* 22.

3. O'er the Ice. Key A♭. First note, m. *Young Voices, II., p.* 41.

4. Morning Song. Key E♭. First note, m. *Sch. and College Songs, p.* 30.

5. Tyrolese Mountain Song. Key D. First note, s. *Sch. and College Songs, p.* 59.

Standard IV.—

1. Hope will Banish Sorrow. Key F. First note, s. *Young Voices, II., p.* 12.

*2. Gipsies We. Key D. First note, m.

*3. Rest thou Troubled Heart. Key F. First note, m.

4. Hearts of Oak. Key F. First note, s_1.

5. Down where the Blue Bells. Key F. First note, d.

Standards V. to VII.—

1. 'Tis Fore-ordained. Key E♭. First note, s. *Code Music Drill.*

*2. The Queenly May. Key F. First note, s. *German Two part Songs, p.* 24.

3. Once again in Stilly Night. Key F. First note, m. *German Two part Songs, p.* 23.

4. Merry is the Gipsies' Life. Key C. First note, s. *German Two part Songs, p.* 29.

*5. In Groves of Fragrant Larches. Key D. First note, m. *German Two part Songs, p.* 16.

Those marked with a star were sung during the examination.

Algebra.

Stage I.—1. Divide $8x^4y + 2x^3y - 2x^2 - 3x^2y + x$ by $2x^2 - x$.

2. Multiply $1 + 2x + 3x^2 + 4x^3 + 5x^4$ by $1 - 2x + x^2$.

3. Add $2x - 3by$, $ax + 4y$, $3x + by$, $y - 2ax$.

4. Subtract the sum of $3a - 2b$ and $2b + 3c$ from $5a - b + 2c$.

5. A school contains x classes : in each there are y boys. How many boys are in the school ?

Answers.—(1) $4x^2y + 3xy - 1$; (2) $1 - 6x^5 + 5x^6$; (3) $5x - ax + 5y - 2by$; (4) $2a - b - c$; (5) xy.

Stage II.—1. Find the G.C.M. of $x^2 - 15x + 36$ and $x^2 - 9x - 36$.

2. Divide 90 into two parts so that one part is two-thirds of the other.

3. Solve $\frac{5x-1}{7} + \frac{9x-5}{11} = \frac{9x-7}{5}$.

4. Simplify $\frac{a^2}{bc} \times \frac{b^2}{ac} \times \frac{c^2}{ab}$.

5. The sum of two numbers is 85, and their difference 27. Find the numbers.

Answers.—(1) $x - 12$; (2) 54 and 36 ; (3) $x = 3$; (4) 1 ; (5) 29 and 56.

Stage III.—1. (*a*) Solve $\frac{1}{2x} + 2y = 5 = \frac{130x}{1 + 12xy}$.

(*b*) $4x + 2y - z = 26$

$x + y - z = 3 = 3x - 4y + 2z$.

2. Find a number of two digits which is eight times the sum of its digits, and such that the difference between its digits is 5.

3. Solve (*a*) $\frac{x}{14-x} + \frac{14-x}{x} = \frac{29}{10}$.

(*b*) $x^2 + 3xy = 34$

$xy + 4xy^2 = 110$

4. The sum of the squares of three consecutive numbers is 77 ; find them.

5. A grazier having bought a number of oxen for £200, sold them again at £22 a head, and gained as much as one cost him. Find the number he bought.

Answers.—(1*a*) $x = \frac{1}{2}$, $y = 2$; (*b*) $x = 5, y = 8$, $z = 10$; (2) 72 ; (3*a*) $x = 10$ or 4 ; (3*b*) $x = 2$ or 34, $y = 5$ or -11 ; (4) 4, 5, 6 ; (5) 10 oxen.

HASTE THEE, WINTER.

Allegretto.
1st & 2nd TREBLES.
BASS.
1. Haste thee, win - ter, haste a - way, Far too long has been thy stay;
Key B♭. f Allegretto.
1st S.
2nd S.
B.
Haste thee, win-ter, haste a - way, Far too long has been thy stay;
Far too long thy winds have roar'd, Snows have beat, and rains have pour'd:
Far too long thy winds have roar'd, Snows have beat, and rains have pour'd:
Haste thee, win - ter, haste a - way, Far too long has been thy stay.
Haste thee, win - ter, haste a - way, Far too long has been thy stay.

2. Haste thee, winter, haste away,
Let us feel the spring-tide ray;
Let the fields be green again;
Quickly end thy dreary reign:
Haste thee, winter, haste away,
Far too long has been thy stay.

3. Haste thee, winter, haste away,
Let the spring come blithe and gay;
Let thy chilling breezes flee;
Dreary winter, haste from me:
Haste thee, winter, haste away,
Far too long has been thy stay.

EDUCATION ABROAD.

BY E. E. FOURNIER D'ALBE, B.SC. (LOND.).

FEMALE SCHOOL PHYSICIANS IN FRANCE.—Several female school physicians have been appointed to posts at Paris lyceums for girls. Thus, Dr.Med. (Mme.) Pilliet-Edwards has been appointed physician to the Lycée Racine, Dr.Med. (Mlle.) Benoit at the Lycée Molière, and Dr.Med. (Mlle.) Chopin, assistant physician at the Lycée Fénélon.

EDUCATIONAL PRIZE COMPETITION.—The Société National d'Education de Lyon offers a prize of 500 frs. for the best unpublished memoir on the following subject:—'Scholastic discipline: Does it suffice to appeal to the sentiments of honour and duty to insure order and diligence in educational establishments? What conclusions can notably be drawn from experiments made during the last years?' Essays to be sent to the General Secretary, Palais des Arts, Lyon, before March 1st, 1893, bearing a motto, and accompanied by a sealed envelope bearing the same motto and containing the writer's name and address.

SCHOOL HYGIENE IN BOHEMIA.—A course of hygiene for teachers is being given this autumn at the Prague seminary for female teachers. The lectures are given by Dr. Cerný in the Bohemian language. They include such subjects as air, its dampness, pollution and ventilation, heat and warming arrangements, the skin, perspiration, washing, and dress, light and illumination, drainage and water supply, laws and regulations pertaining to public health. There are about thirty teachers attending the course, mostly ladies.

PROPOSED SOCIETY OF INFANT PSYCHOLOGY.—Professor Dr. Wendt, of Troppau, proposes the foundation of a Psychological Society for the special purpose of organising research in the psychology of children, a department which has since the labours of Siegismund and Preyer become one of great practical interest and importance.

AUTUMN COURSES FOR TEACHERS.—At the University of Jena there will be, as in previous years, a set of fortnightly courses for college-educated teachers. They deal principally with Physics, Zoology, Botany and Geography. Prof. Gärtner will also lecture on School Hygiene, Prof. Rein on Principles of Teaching, and Privat-Docent Dr. Ziehen on Physiological Psychology, with Demonstrations. The fee for each course of ten or twelve lessons will be fifteen marks. Gentlemen wishing to join are requested to apply to Profs. Detmer or Rein. Information as to lodgings may be obtained at the Botanical Institute on October 2nd. In the evening there will be a social meeting at the Weimarer Hof of those attending the courses, which will extend from October 3rd to October 17th.

PHYSICAL EDUCATION IN CROATIA.—According to the new regulations each school is to be provided with a piece of ground for gymnastic exercises. This is to be as close to the school as possible; level, strewn with sand, and free from obstructions. The exercises are to be conducted on the Swedish system. Regarding sanitary arrangements, the walls are not to be whitewashed but painted with a yellowish-grey oil colour, and thoroughly disinfected from time to time. In case of an epidemic teachers are to co-operate with the physicians in disseminating information and in superintending disinfections. By a Ministerial order the vertical writing has been established as the uniform standard for national schools. The manner of holding the pen, the attitude of the body in writing, and the choice of writing materials have also been duly regulated.

AFTERNOON LESSONS ON HOT DAYS.—The German Emperor has taken steps to ensure the efficient working of the Ministerial injunction to the provincial school boards to enforce the cessation of lessons in the higher schools during hot afternoons. In reply to his inquiries, Dr. Bosse, the Minister of Education, said that he had called the attention of the Provinzial-Schul-Kollegien to the existing regulations. The Emperor said he was glad to hear it, but as such general regulations were very apt to be ignored, he would like to see a tabular statement drawn up showing what effect the Ministerial circular had had upon the various higher schools. Those who are acquainted with the miseries of two hours' gymnasium work on a broiling German summer afternoon will appreciate the Emperor's efforts to make the directors put the health of their pupils and staff before a pedantic fulfilment of the 'Lehrplan.'

RELIGIOUS INSTRUCTION AND CRIME.—The Deputies Dr. Ebenhoch and his colleagues have interpellated the Austrian Minister of Justice regarding a speech made by the Public Prosecutor on the 21st June during a criminal trial at the Wiener-Neustadt. The latter attributed the increase in the frequency of murders to the inadequacy of religious instruction in the schools, and declared that moral education was being neglected. 'What good is it,' he is reported to have said, 'if the children have committed to memory the Catechism, if they can patter the doctrines of faith to perfection, while heart and soul are neglected and no attention is paid to the ennobling of the moral nature? As long as this is not mended we cannot hope for any improvement, and brutality will not give way to true humanity.' These words were taken not only as casting an aspersion on the catholic teaching of faith and morality, but as containing a sweeping accusation of religious instructors in German-Austria. The interpellators have therefore asked the Minister whether he was willing to limit such an overstepping of official functions on the part of Public Prosecutors, and what he intended to do in order to obtain satisfaction in this case for the offended religious teachers.

ASTRONOMY AND 'HUMOUR.'—A curious attempt to combine the sublime with the ridiculous is found in a little book published at Berlin, entitled 'Von Himmel.' Astronomical Tales for the People and the Young, by W. Schmitt. It is written with the avowed intention of showing that astronomy may form the subject of a lively discussion. The 'humour' is sometimes very questionable. Thus we read of Saturn: 'He is the most curious of the lot. He boasts eight moons for his companions and one ring, a saint's halo, only he does not wear it round his head, but round the equator.' And further: 'The moon is smaller than the earth. Of course, she is only about as large as a regular good pancake. But you might have enough to eat at it all your life. If every inhabitant of a town of 10,000 were obliged, or allowed, to eat daily a piece of this cake 1m. in diameter, the moon-pancake would last for over three million years. If every inhabitant of Baden were to partake, it would last 26,000 years, and for all the inhabitants of the globe, taking these at 1,400 million, it would still last 29 years. What a feed! What a consumption of flour and eggs!'

BREATHING APPARATUS.—An apparatus for exhibiting the process of breathing is described by Prof. Meutzner in Heft, six of the *Zeitschrift für Physicalischen und Chemischen Unterricht*. A glass cover is provided with an indiarubber stopper at the top, through which is passed an indiarubber tube representing the windpipe, dividing into two (the bronchi). At the end of the two branches are two bags of very thin rubber membrane representing the lungs. At the bottom, the glass cover, which represents the thoracic cavity, is closed by a strong membrane (the diaphragm). If the membrane be pressed in, the bags contract, and expel the air. On releasing the 'diaphragm' the 'lungs' are filled with fresh air.

AMERICAN DISTRICT ASSOCIATIONS.—A word in favour of these smaller Teachers' Associations is spoken in the *Teachers' Institute* by G. S. Young, of Colorado. 'There is nothing helps the teacher to be more progressive than attendance at an enthusiastic teachers' association. To the teacher who has toiled for weeks in that small school-house far from town and home, where there have been many petty trials to vex and worry her, the association comes as a ray of sunshine in the gloom. The discussion of great educational principles builds up public confidence in educational work . . . The best aims of an association may be defeated by a hastily prepared programme. There should be papers covering the subjects of general knowledge. The second part should be devoted to methods, experience, and queries, and still another to musical and literary entertainment. Too much time should not be spent in accepting invitations for excursions, nor on the lighter part of the programme. Among the many results of an association may be noted the following: First, the teacher's power to impart instruction and to govern is enlarged and broadened. Second, new ideas and methods are put into action. Third, each individual school is very much improved. Fourth, school boards and patrons realise that their teachers are progressive. Fifth, uniformity of methods is secured; the pupils of all the schools in the district are placed upon the same educational plane. Let us have these associations, and such an educational move will over-sweep our land as will place us one step nearer our high ideals.'

A YOUNG LIBRARIAN.—A twelve-year old boy, a pupil of a New York public school, thought he would like to start a free library for the pupils in his school. So he began to save his allowance towards it, and before long he had $314·06 in the bank. Last January, Freddie, for that was the boy's name, was taken ill and died. His father, who knew of his son's plan, decided to carry on the work. He added $250 to the fund. Other friends, who loved Freddie, added to it till the sum amounted to $3,300. The board of education has given consent to use a room in the school-building, and the books are to be purchased at once.—*Teachers' Institute.*

ASSISTANT TEACHERS IN AUSTRALIA.—A deputation from the Victorian Male Assistant Teachers' Association waited upon the Minister of Public Instruction on June 10, in order to bring under his notice several matters on which the members of the Association desired to represent their views. Approval was expressed of the

idea of abolishing the Committee of Classifiers, this action being regarded as likely to effect a reduction in the expenditure without causing any loss to the department. It was also urged that assistant teachers should be allowed to make their personal representations to the Department without their communications having to go through the hands of head teachers; that the income of the department should be increased by leasing valuable sites on which schools which were not now required had been erected; that all teachers should have the option of retiring after thirty years' service, and that payment by results should be dispensed with, this last suggestion being supported by the arguments that the system encouraged 'cramming,' and prevented inspectors from devoting time and attention to the general supervision of the work done at the different schools. In reply, Mr. Peacock thanked the deputation for giving him an opportunity of ascertaining exactly the ideas of the Association in regard to the subjects which had been touched upon. He dissented, however, from the suggestion that had been submitted to him in regard to the mode in which representations should be received from assistant teachers. In his opinion the plan proposed would be subversive of discipline. With regard to the leasing of certain school sites, he could say, from his own experience, that there were many districts which were provided with too much school accommodation. He had always asked the school inspectors to report concerning the schools that might be closed without serious inconvenience to the district concerned, and the deputation might be sure that this subject would receive his favourable consideration. Bills had been drafted for the abolition of the Committee of Classifiers and of the payment-by-results system, and it was hoped that when the retrenchment proposals of the Government with reference to the Education Department were made known, they would be received with all loyalty by the general body of teachers.

SEASIDE HOMES FOR CHILDREN.—From the last 'Publications of the Imperial Health Office' for Germany it appears that the seaside hospices for sick or delicate children have done much good work. The Kaiserin Friedrich Hospiz in Norderney accommodated 615 children and 40 pensioners, that at Wyk on Föhr 141 children, the Friedrich Franz Hospiz at Gross Müritz in Mecklenburg 190, and that at Zoppot (near Danzig) 82 children. Out of a total of 1,068 children only 370 (35 per cent.) paid the increased rate of 15 marks per week, whereas 698 (65 per cent.) were free, or were sent by societies and charitable institutions. Out of 3,700 children treated during the last few years, 2,490 came from Prussia alone. During the last five years the success of these establishments has been such that 62·8 per cent. were dismissed cured or much improved, 33·4 per cent. had improved, and only 4·8 per cent. were not cured. The sea air and sea bathing exerted a specially beneficial influence upon scrofulous and anæmic children and those with complaints of the respiratory organs, chronic pulmonary catarrhs having been in many cases completely healed.

PROGRESS OF EDUCATION IN JAPAN.—The sixteenth report of the Minister of Public Instruction, published at Tokio in August, 1890, gives some interesting particulars of the vast progress which the Empire of the Rising Sun has made of late years in the way of education. Since 1887, a complete reorganisation of teaching has taken place on a uniform plan for the whole country. The University of Tokio has been founded; an art school, a school of music, and a higher school for girls has been established; in short, the superior and classical education has been transformed. To perfect the existing institutions was a comparatively easy matter, says the report, and important results have already been achieved in this direction. Things could not move quite so fast with regard to the normal and district secondary schools. As regards primary schools, their establishment, their redistribution, their financing, and their testing by regular examinations had to be completely rearranged. It is clear that such changes could not be brought about without troubling some spirits, as was indeed shown by the initial falling off in the number of students. Since the second year, however, the advantages of the new educational system have been appreciated by the families. Those which had hesitated most to pay the school fees have decided to do so, and have become reconciled to the greater assiduity imposed upon the children.

At the end of the financial year, 1888, the number of primary schools in Japan was 25,953, out of which 24,295 were government, and 659 free schools. Out of this number 1,522 were higher schools, 12,649 middle schools, and 11,782 elementary schools. For the district of Tokio alone, we find 804 public or private schools, employing 1,615 masters and mistresses. The total number of pupils amounted to 2,927,868, out of which 54,109 belonged to private schools. These figures are evidently destined to rise rapidly, for the total number of infants old enough for school amounts to 6,920,245, and there are still more than half the children not availing themselves of their advantages.

The District Secondary Schools are 41 in number, with 8,903 pupils, and 531 masters. They have awarded 261 diplomas in a year. There are 7 higher schools with 3,938 pupils, 274 native and 14 foreign masters.

The University of Tokio accommodates already 23 Fellows, who pursue original research in Law, Taxation, Agriculture, Medicine, Surgery, Civil Engineering, the Japanese language, Anthropology, Astronomy and Mathematics. In the various Faculties constituting the University, the Faculty of Law numbers 222 students, 50 of whom are bursars; Medicine counts 281, Engineering 90, Arts 40, Science 31.

Besides the University, there are 23 special schools of Law, Medicine, Arts, Agriculture, Commerce, Engineering, European languages, Veterinary Surgery and Materia Medica, Navigation, Philosophy, Mathematics and Art. Also a higher school of Commerce, a Superior Technical School, and about 31 other institutions devoted to minor subjects exclusively.

The income of the Education Department amounted in 1888 to £1,400,000. An important part of each year's income is reserved every year for the endowment of the University and the National Collections. These figures are quite sufficient to show with what wonderful energy this Empire of the far East is striving to obtain an honoured place among civilised nations.

SPENCER'S 'EDUCATION.'

BY THOS. CARTWRIGHT, B.A., B.SC.,

Author of 'Mental Science and Logic for Teachers,' Co-Director of the Birkbeck Training Classes.

THE four Essays of Spencer constitute a most important part of England's contribution to that Cinderella of the sciences, Pedagogy, and for this reason the work is the favourite classic at English pedagogic examinations. The young teacher is frequently confronted, when perusing the essays, with references and allusions which need elucidation, and with ultra views which call for criticism. To render assistance in this connection is the object of this paper, which, in addition to notes upon the text, will contain brief answers to all the questions on Spencer which have been set by the Education Department.

The general defects of the work are due to the fact that Spencer is a theorist only, as far as education is concerned, and cannot, therefore, put to the test of experience the opinions and methods which his fecund mind so readily supplies. As a writer in Sonnenschein's 'Cyclopædia of Education' remarks, 'the separation between the educational theorist and practical educator is forcibly illustrated' by the fact that no indication whatever is given as to whether Spencer's remarks apply to education on the individual or class system. 'The learner's aptitude and needs, and the intrinsic value of the subject, have been treated in a masterly manner; but the conditions under which the student is to study these subjects have hardly been regarded at all.' Again, Spencer, whose power of reducing multiplicity and variety to unity is most conspicuous in all his works, is occasionally in danger of overshooting his mark in following this enticing pursuit. Instances of this will be referred to. The style also, charming though it be, is calculated to bewitch the mind and compel acquiescence in fallacy which, clad in more sober dress, would be readily detected and ruthlessly denounced. W. H. Payne says that the style of the work is imposing, and therefore it imposes upon its readers; and Quick regrets that Spencer 'has not kept the tone of a man who investigates the truth in a subject of great difficulty, but lays about him right and left after the manner of a spirited controversialist.'

With respect to that part of the exordium which deals with the statement that decoration is prior to

dress, and that the ornamental overrides the useful in education also, no comment is necessary. When Spencer proceeds to weigh the value of the various 'knowledges,' in order to formulate a curriculum sound and universal, he is giving his attention to a question of momentous import, the correct solution of which would be an unquestioned boon to teachers, students and the world at large. Moreover, the measure of value, viz., 'how to prepare for complete living,' if properly understood, may be accepted ; but if it means that the child, whilst yet a child, is to learn everything which may conduce to this end it is certain, as Jos Payne says, that 'the growing mind is incapable of learning—*i. e.*, so as to know—the immense number of subjects necessitated by this theory of complete living ; and even if it were capable of getting a smattering of general knowledge, such a knowledge would not be a preparation for complete living. . . . School education is directly opposed in its very nature to the theory that the attempt to grasp universal knowledge is the same thing as a preparation for complete living. If, however, we mean by such preparation the equipment of the pupil by physical, moral, and intellectual discipline, by securing for him a complete command over the powers which he possesses, by furnishing him with the complete possession of those comparatively few and simple ideas which form the mind's substratum of the mind's subsequent acquirements—in this sense only is education a preparation for complete living.' With respect to Spencer's triumphant reply to all his questions as to what should be the curriculum, it is to be noted that no formal definition of science is put forward. He rightly insists upon the exclusion of facts which are in isolation, and therefore unorganisable, on account of their lack of connectedness with other facts, which could be included with them in those generalisations constituting the essence of Science. We will conclude this month with a tabular statement of the subjects which Speneer mentions as interwoven with the various activities connected with perfect living, and, in our next paper, we will see how far Spencer's suggestions are practicable.

SPENCER'S CURRICULUM.

Activities concerned in—	Sciences connected therewith.
(1) Direct life preservation.	Physiology.
(2) Indirect life preservation = obtaining a livelihood.	All sciences possibly required. Logic, Mathematics, Mechanics, Physics, Chemistry, Astronomy, Geology, Biology, and Sociology are specifically mentioned.
(3) The rearing of offspring.	Medicine, Psychology, Ethics.
(4) The functions of a Citizen.	Descriptive Sociology and Psychology.
(5) Æsthetics, or Fine Art.	The Science corresponding to each Art.

(*To be continued.*)

EDUCATION IN LITERATURE.

BY THOS. CARTWRIGHT, B.A., B.SC. (LOND.)

Author of 'Mental Science and Logic for Teachers', Co-Director of Birkbeck Training Classes.

About a dozen years ago an article from the pen of gifted James Runciman appeared in the pages of a contemporary. It was entitled 'H.M.I. Puzzle,' and the shafts of ridicule and sarcasm, which Runciman knew so well how to hurl, put an end to the vagaries of a crotchety Inspector whose name rhymed with Puzzle.

Mr. Yoxall's article in the *Educational Review* is an attempt to prove that H.M.I.S. is 'the most autocratic official west of Russia.' He takes the Inspector in general, refusing to discuss personal peculiarities, which perhaps tell equally for and against. 'Upon the Inspector's dictum almost entirely depend the progress of children from one class to another, the reputation of the school and of the teacher, the income of the school and often the income of the teacher, the continuance of the school, and often the professional continuance of the teacher.

He can, 'by a mere stroke of his pen, make or mar the dominie and his academe.' The skill of the teacher, the capacity of the taught, methods, school books, school architecture, the need of a school in this locality, or the surplusage of a school in that, as well as the assessment of the Grant—all are subject to the decision of Mr. Yoxall's Lord Paramount. 'When the year's work is done it is done with, just as the finished carpet is ready for the warehouse ; and, if the Inspector chooses to examine the reverse side of the carpet and appraise it by its seamy side, there is none to say him nay. He is Sir Oracle : his utterance reverberates, unchecked and unrevised, through the mighty speaking trumpet of "My Lords," and all that the local authority and the teacher may do is, listen and acquiesce : protest or opposition to the oracular voice is hardly possible.' As the purse-strings are held by the Inspector great unwillingness to displease him is exhibited by the school authorities. 'Even many of the wealthiest and most important School Boards tend something towards obsequiousness to the powers that be, wherever money is concerned ; and thus the Inspector becomes lord paramount of the whole educational concern.' Most carefully should the wielder of such plenary powers be selected ; yet 'hitherto the qualifications for an Inspectorship have been—influence in high places plus a more than usually creditable university career.' Judgment, moderation, sympathetic temperament, a fine sense of justice may, or may not have been, possessed by the person appointed to the office.' The claim of the schoolmaster of ability, experience, and culture for admission into the charmed circle is not enlarged upon ; but adequate skill in teaching, sympathy, geniality, discrimination, slowness to wrath, and quickness of perception generally, are rightly insisted upon, as a *sine quâ non*, whoever may be the Inspector. A knowledge of pedagogy, and then the higher education are the other necessities to the *beau ideal* of a good Inspector. As all requisites, except the last, are lost sight of in appointing H.M.I.S., 'it is plain, therefore, that the present method of choosing an educational dictator is faulty to the last degree.' Although university education is not a sufficient qualification,

its value is duly acknowledged by Mr. Yoxall, but 'it is as absurd to imply that the Wrangler or Honours man must necessarily inspect schools fitly, as to imply that a wide historical study of the Elgin Marbles qualifies a man to teach in the life classes at the Royal Academy.'

'In short and in sum,' concludes the writer, 'the Inspector should be a man just and sympathetic, experienced in teaching, and endowed with that wisdom which is as far above learning as learning is above rubies. Who will say that these are the characteristics of the average and typical Government Inspector of Schools?'

The ever-ready and facetious Sheridan—of whom it was said, by Byron, that he was the author of the best comedy, the best farce, the best opera, and the best speech in the language—on one occasion launched forth the following scathing retort to a speech of Mr. Dundas:—'The Right Honourable Gentleman is indebted to his memory for his jests, and to his imagination for his facts.' The writer of a puerile article entitled 'A School for Mirth,' in this month's *Macmillan*, lays himself open to condemnation equally sweeping and equally severe, for this *laudator temporis acti*, as is often the case with those who sigh for the 'Good old times of fifty years ago,' closes his eyes to the most obvious facts with such irritating serenity, and puts forward the most apparent fallacies with such unblushing effrontery, as to make one wonder how such an article could have found its way into such a periodical. 'Humour,' we are told, 'is in its decay, and dulness is on the increase, especially among the poorer classes and in village life.' The many attempts which are made to remedy this alarming state of affairs have deservedly failed, for 'having educated' (on compulsion) 'the working man to the last pitch of dulness and satiety, he is now to be amused and instructed, if possible, by contract. We wonder which he will prefer? Probably, after a course of elementary lectures on science, and an invitation to join the VI. Standard in learning Shorthand, and to take twelve lessons in Tonic Sol-fa in order to assist personally in providing Pleasant Evenings for the people, he will feel that these national jokes would throw a gloom over any community, and that he is not to blame if they have affected his own natural cheerfulness.' (N.B.—This is up-to-date sarcasm.)

'Delusions,' we are told, 'die hard' (this is sufficiently plain from a perusal of the effusion under consideration), 'yet surely we shall some day abandon the pretence that the British workman's habits, tastes, opinions, and ideals are identical with those of his employers?' In reply to this we unhesitatingly affirm that there is nothing refined, elevated, or ennobling which is characteristic of the employer as opposed to the employé. Although there may be a monopoly of *quasi*-refinement, true nobility is by no means confined to them of the blue blood. The writer in his wisdom proceeds to give a revised version of Pope's line thus: 'A little knowledge may or may not be a dangerous thing, but it certainly is an unsettling thing. From the beginning the herb of discontent has grown side by side with the tree of knowledge. The nation, like Frankenstein, is confronted by a self-constructed problem, a monster of its own making. The son of the soil seemed, so to speak, a natural product, but what is to be done with the child of the lecture hall?' Again, sapient sir, do we presume to answer your conundrum. Give the child a career and he may shed lustre upon the lecture hall and all therewith connected.

The son of the soil is being petted and has developed into a spoilt child, who is too much taken up with his own grievances to wish to be gay. A gibe at women next follows: 'In their anxiety to ameliorate the condition of the very poor they have lately brought themselves to believe more amusement to be the universal remedy for the shortcomings of the cottage-home. This is only natural,' adds our Solon, 'for was not Adam contented and happy in Eden until Eve, smitten with dulness, listened to the serpent's blarney, for the sake of "a little change," so that woman's faith in the charm of variety is another example of the working of the great principle of heredity' (Huxley, please note this wonderful discovery.) Still 'Hodge knows very well that the whole condition of village life and cottage homes is changed, and he has realised, long ago, that the strongest, if most innocent factor in the change is that very education from which so much was hoped.' In the golden age of ignorance, for which our writer so wofully yearns, 'the most perfunctory attendance at the dame's school relieved the mothers of part of their responsibilities, and also laid the flattering unction to their souls that the three R's, the utility, nay, the necessity of which nobody would deny' (what a magnanimous concession!) 'were being duly taught and learned. But the three R's had this inestimable advantage over the present system: that they were *easily learned and more quickly forgotten;* and once the puzzling duty of mastering them was discharged the sturdy scholar could turn to what they considered' (with some excuse) 'the real business of life. It would be useless,' continues our oracle, 'to consider whether compulsory education is an unmixed good, and, equally so, to consider the same conditions of life as when parents were free agents. Nearly all responsibility is taken from them. A little more and they would be regarded as mere providers of so much raw material to be prepared for use as the reigning government decrees. He remembers village life before it was necessary to satisfy the requirements of all the "ologies." Then quick Polly could attend school whilst dull Susan played the more congenial part of household drudge, but *nous avons changé tout cela* and, in consequence,

> 'Life is as tedious as a twice-told tale,
> Vexing the dull ear of a drowsy man.

for both must go through the educational mill, and poor Susan is ground exceeding small. Alas! poor Susan, say we. The boys, in the full enjoyment of fresh air and outdoor employment, trotted merrily at father's heels, making early acquaintance with, not only every bird, beast, and flower, but also farm animals and charges, thus gaining a facility for tending them never acquired after early boyhood. Then comes the glory of the gaiters and whip, as the youth blossoms into the ploughman or teamster.

'Girls were kept at home at least part of every day, hence much ability in baking, washing, mending, and making.

'Now the neediest mother can see little of her children after the early hour when, ill-fed by a scanty breakfast, and with but poor furnishing for the midday meal, all over five must set off in all weathers to pass the rest of the day in a hot and noisy schoolroom.

'Botany in the upper standards is a poor substitute for the freedom of green lanes and blossoming hedge-

rows; a slice of bread and bacon in the pocket is a more convincing argument than the most elaborate thesis on the chemistry of foods. "They all larn themselves so onsatisfied they're forced to go to the towns to get ill," is the verdict of a wise old woman, which dictum our Solomon approvingly quotes. 'Matthew Arnold's poor child of nature need not go to a Social Science Congress in order to be dismayed at the dreary vista of spectacled women and men scant of hair. The schools obligingly supply rows of goggled children, and the teacher's bald pate is always *en evidence*. Poor fellow,' says our fount of undiluted sagacity, 'it is perhaps unreasonable to expect that, with so much to keep up inside the head, anything can be sucessfully cultivated outside.' (*N.B. This is a Goak.*)

'Not satisfied with working itself black in the face, in proof of which please note the cinder heaps of the Black Country, this distraught land is bent upon learning itself sad at heart, as is evidenced by the eviction of the merry laugh and sweet content from the bye-paths of Arcadia; and this consummation, sad and deplorable, is thy work, O ruthless Education!

'Village entertainments are called into being as a panacea for this terrible *ennui*, anent which the sensible observation is made that villagers are more likely to provide the right article than a committee of their betters, the rule for diversion being "all is fine that fits." Where are the old amusements gone? Who has kidnapped the Christmas mummers, with Father Christmas at their head? Why should the procession of the rush-bearing cease? Where shall we find the good old custom of carrying palm branches at the close of Lent, and cakes on Mothering Sunday? Wherefore do we not wear our oak leaves on Restoration Day? What evil genius has put into desuetude the merry junketings of May Day and the Harvest Home? All are gone from the sight like a beautiful dream, and great has been the loss of the pastoral poet. In these degenerate days, village feasts are nothing if not political, gatherings bring strife, and meetings mean debate. The chronicler of ancient merry-makings must hasten, or nothing will be left to chronicle. The pathos and spirit of the National School sing-songs are conspicuous by their absence. Many such ditties, stirring, martial and manly, still linger in the west, but the times are out of joint, and little meaning have these songs for a generation that knows not war unless it be the war of strikes, nor heroes other than paid agitators, nor public spirit which is not lost in the dreary prate of utility.

'To correct all this, the vicar and the squire must participate in the pleasures of the yokel, and so fan into life the taste for every kind of harmless and invigorating outdoor sports always in preference to so-called accomplishments. . . The study of the Fine Arts can never be friendly to the cottage hearth. To have endless patience with every detail of the daily *ménage*, the less the aspirations for the mastery of Art or Literature are indulged in the better, and efficiency in either will always be a formidable rival to the more homely accomplishments of housewifery. Art is long, and the laborious day is already all too short to make enough of the scanty material at hand for the comfort and well-being of life.

'It is the well-nigh lost spirit of simple happiness and content which we wish to restore. The pleasures of life are still to be had, not, perhaps, for the asking, but certainly for the effort of making them for ourselves, and, fortunately, they are never more accessible than in their woodland dress.'

A good many things have been laid at the door of education; but we believe that the author of the article above referred to has succeeded in formulating the most preposterous and ridiculous charge which has ever been levelled at the head of the system of (so-called) compulsory instruction which has now been in vogue for upwards of twenty years.

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PUPIL TEACHERS' COURSE.

I.—Recent Annexation.

During the last quarter the British flag has been hoisted over the Gilbert Isles.

This cluster, also called the Kingsmill Group, consisting of fifteen isles, is situated in the Pacific Ocean between latitudes 1° 0′ S. and 2° 30′ N., and longitudes 172° 0′ E. and 174° 30′ E. They are of inconsiderable elevation, the height above the sea nowhere exceeding 20 feet; but sufficient fresh water is obtainable, though sometimes of a brackish character.

Their structure is coralline, and the soil consists of vegetable mould, sea refuse, sand, and coral debris. It is seldom a foot in depth. The chief productions are the cocoa-nut, the bread-fruit, and the yam.

The sea is making somewhat formidable inroads, and the habitable area is said to be decreasing.

In features the islanders, numbering 60,000, are more akin to Malays than Polynesians, and are noted for their tendency towards suicide. Of late years the group has attracted a little more attention than formerly owing to the scramble among the maritime powers of Europe and the United States for possessions in the 'South Seas.' Indeed, our Government is credited with merely forestalling the Yankees in annexing the group, although a plausible excuse was ready in consequence of the committal of outrages by the natives.

II.—Examination Hints and Advice.

All Pupil Teachers are now either in close proximity to their annual examination or else are exactly half-way between their last and their next.

Where there are no Pupil Teachers' centres, we hesitate not to say that Teachers' Associations ought to take up their burden and organise periodical examinations.

In either case the period is one that demands revision and tests. We shall therefore curtail our remarks and devote our space mainly to furnishing a complete set of questions, specially compiled by the teachers of the Macclesfield and District Association.

To Certificate Candidates, Scholarship Candidates, and Pupil Teachers we have so often given voluminous directions as regards examination, that we shall refer our readers to them for detail, and content ourselves with impressing the most important points only.

The test questions should be worked as soon as convenient, the errors of fact and the deficiencies of style, method, and information pointed out, and then revision possibly from a Pupil Teachers' Year Book should occupy all the time between the corrections and the Government Examination.

At the examination teachers should—

(*a*) Have their papers ready headed, analysis form ready ruled, and their implements all in order.

(*b*) Precisely follow the printed directions of the question paper and the verbal ones of the Inspector.

(*c*) Start work at once and stick to it, minding their own business only.

(*d*) Be neat and tidy, methodical and systematic, seeing that neatness, order, spelling, and writing secure marks on every paper.

(*e*) Give the Inspector present and the subsequent examiner as little trouble as possible.

(*f*) Apportion their time fairly between the different subjects and the different questions.

At the examination teachers should *not*—

(*a*) Write between the lines or on both sides of the paper.

(*b*) Answer any question haphazard or in any style, or fail to select the most suitable questions and the best style (tabulated or otherwise) of answer.

(*c*) Forget to revise each literary answer when finished, and each step of the mathematical answer as soon as worked.

(*d*) Omit the theoretical questions in Arithmetic, the deductions in Euclid, the Music paper, and the recommended questions.

(*e*) Depart from the examination room until actually told to go.

(*f*) Fail to insert diagrams upon the least excuse for their appearance.

III.—Test Examination Questions.

MORNING PAPER.

English.

Maximum Marks 120.

First Year.

(Answer Questions 1 and 5 and two other Questions.)

1. Analyse the following and parse the words in italics:—

'Now, gallant *Saxon*, *hold thine own!*
No maiden's arm is round thee *thrown*,
That desperate *grasp* thy frame *might feel*,
Through bars of brass and triple *steel*.' 30

2. (*a*) What is a Transitive Verb? (*b*) Define Voice. (*c*) What is the Voice of the verbs in the two appended sentences?:—

'The boy *was given* a book.'
'The spring *is gone*.' 30

3. What is the precise signification of the final syllable in each of the following words?:—

Statecraft, *Farthing*, *Landscape*, *Toothsome*, *Inward*, *Thraldom*, *Wretched*, and *Doubtful*. 20

4. Give the Plurals of *dwarf*, *donkey*, *pony*, M.S., *pea*, *deer*, *radius*, and *analysis*. 20

5. Reproduce in your own words the story read by the Examiner.

Second Year.

Maximum Marks 120.

(Answer Question 1 and any two others.)

1. Paraphrase:—

'The rain had fallen, the Poet arose,
He passed by the town and out of the street,
A light wind blew from the gates of the sun
And waves of shadow went over the wheat;
And he sat him down in a lonely place,
And chanted a melody loud and sweet,
That made the wild swan pause in her cloud,
And the lark drop down at his feet.' 40

2. Analyse this passage and parse the words in italics:—

Some clouds *that* had over us hung
Fled, *chased* by her melody *clear*,
And *methought*, *while* she *liberty* sung
'Twas *liberty only to hear*. 30

3. Explain the force of the italicised syllables in each of the following words, and give another illustration of the use of the same prefix or affix:—

*Un*manly, *Ad*vise, *An*ticipate, *Cis*-Alpine, *Preter*natural, Break*age*, Civ*ic*, Joc*ose*, Effer*vesce*. 30

4. To how many uses is the Objective Case applied? In every case append an example. 20

Third Year.

Maximum Marks 120.

(Answer Questions 1 and 2 and any other one.)

1. Paraphrase:—

'Was never wight, since that the world began
That slew so many monsters as did he.
Throughout this wide world his name ran,
What for his strength and his high bounty,
And every realm went he for to see.
He was so strong that no man might him let.
At both the world's ends (saith Trophee)
Instead of bounds, he a pillar set.' 40

2. Analyse this sentence and parse the italicised words:—

Our present repose is no *more* a *proof* of inability *to act than* the *state* of inertness in which I have seen *those* mighty *masses that* float on the waters *above* your town *is* a proof *that* they *are devoid* of strength and *incapable* of *being fitted out* for action.' 40

3. What classes of words in English are mainly of Teutonic origin? Write a short sentence composed chiefly of such words. 20

4. Write out six each of the commonest Greek and Latin Roots, and form words therefrom containing also a prefix or affix, giving the meaning in each case. 20

Domestic Economy.

Third Year.

Maximum Marks 60.

(Only two Questions to be attempted.)

1. Give the methods for the different kinds of darning and say in what cases each is used? 20

2. What facilities do the Government offer for the investment of money; and why should we distrust any investment offering a high rate of interest? 20

3. Mention some of the ways in which a housekeeper may be unthrifty. Give recipes for using up pieces of bread and any surplus pieces of fat. 20

4. What would you do in the case of a child in school (1) catching fire; (2) getting a pencil in the ear or nostril; (3) cutting the head severely; (4) bleeding excessively from the nose? 20

5. Name the different utensils and substances used in washing. Give directions for washing a print dress and flannel shirt. 20

Arithmetic.

Maximum Marks 100.

Candidates.

(Answer three Questions only.)

(*a*) For those to be examined as Standard VI.

1. Simplify:— $\frac{\frac{5}{6}\text{ of }2\frac{2}{3}}{\frac{5}{6}+\frac{2}{3}} \div \frac{2\frac{1}{2}-\frac{3}{10}}{\frac{5}{8}\text{ of }1\frac{4}{5}}$ 25

2. At what rate per cent. will £278 15s. amount to £322 13s. 0½d. in 4¾ years? 35

3. In a school of 680 children there were 7 boys to every 10 girls. How many boys were there? 30

4. Two men made 390 boxes in 26 days. If one made ⅔ as many as the other and received £13, how much did the other earn per day? 35

(*b*) For those to be examined as Standard VII.

(Answer three Questions only.)

1. By selling a house for £280 I should lose 30 per cent. What must I sell it for to gain 15 per cent? 35

2. The average age of 10 men is 58 years. Two are each 45 years, and 5 are each 50 years old. Find the average age of the others. 25

3. What sum at 5 per cent. simple interest will produce the same income as £1,700 invested in the 4 per cents at 85? 30

4. Two trains start at 9.30 a.m. from stations 250 miles apart. They approach each other at rates of 35½ and 24½ miles respectively. When will they meet and what distance has each travelled? 35

First Year—Boys.

(Answer Question 5 and two others.)

1. (*a*) Find the L.C.M. of 10, 15, 30, 32, 36. Why can we erase 10 and 15? Prove that your result is the L.C.M. 15

(*b*) What kind of vulgar fractions can be expressed as finite decimals? Can the quantity $\frac{1}{3}-\frac{1}{7}-\frac{1}{21}$ be so expressed? 15

2. Simplify:— $7-\left\{8\frac{1}{4}-\frac{6\frac{1}{4}\times\frac{1}{5}+\frac{2}{5}}{\frac{5}{6}-\frac{5}{12}\text{ of }\frac{3}{5}}\right\}$ 25

3. The difference between $\frac{3\frac{1}{2}-1.125}{1.265}$ of 40 guin. and ·00558 of £10,000 was earned by John and William, but John earned as many pence as William did halfpence. How much did each earn? 30

4. $\frac{3}{10}$ of an estate cost £937.9125; how much should be paid for ·38 of it, supposing the value of the whole estate had fallen by £1,440? 35

5. A man goes a tour. The cost of his board is ·5 of the money he had at first; his railway expenses amount to $\frac{3}{11}$ of the cost of his board, and sundries to ·3 of his railway expenses. If these items make a total of £93½, what had he at first, and what fraction of his money has he left? 35

First Year—Girls.

(Answer Question 5 and two others.)

1. A Bill: 21 ac. 1 rd. 21½ pls. at £4 per ac.; 13½ stones at 7 lbs. for 1s. 9d.; 95 at 1s. 6d. per score; 51¾ lbs. at 1s. 4d. per lb. 30

2. 17,689 articles at £19 14s. 8¾d. each. 25

3. 5 fur. 2 ps. 2¾ yds., at £2½ per mile. 30

4. Find by Practice the value of £2,500¾ at 12s. 9½d. in the £. 35

5. (*a*) Define *Measure* and *Multiple*. What is the difference between Common Measure and Least Common Measure? 18

(*b*) Simplify: $\frac{1}{13} - \frac{1}{14} - (\frac{1}{14} - \frac{1}{15}) - (\frac{1}{15} - \frac{1}{16}) + \frac{3}{16 \cdot 13}$. 17

Second Year—Boys.

(Answer Question 2 and two others.)

1. I received ⅛ of a legacy. That sum was sufficient to produce in 219 days an income of £7 2s. 6d. Find the legacy. 25

2. Define Ratio and Proportion. When would it be incorrect and when advantageous to interchange the second and third terms? 35

3. What is the quarterly income from £12,588 in the 2¾ per cents. at 94¾ (brokerage ⅛)? 30

4. At what rate per cent. will £1,501 5s. amount to £1,553 15s. 10½d. in 2 years 292 days? 30

5. If the difference between the true and banker's discount on a bill for 12 months be 5s., interest being at 4 per cent. per annum, find the amount of the bill. 35

Second Year—Girls.

(Answer Question 4 and two others only.)

1. Simplify:— $\left\{ \frac{2\frac{1}{3} + \frac{2}{5} - \frac{1}{15} \text{ of } 6}{1\frac{1}{4} + \frac{1}{12} \text{ of } \frac{3}{1\frac{1}{2}} - \frac{1}{2}} \div \frac{1}{4} + \frac{1}{4} - \frac{1}{8} + \frac{99}{1331} \right\}$ 30

2. Find the value of $(\frac{2}{5}$ of $4\frac{1}{2} + \frac{1}{2})$ of 5 fur. 20 poles and of $(\frac{2}{3}$ of $2\frac{1}{4})$ of £3 0s. 6d. 25

3. If 5½ guineas be divided among 19 boys and 13 girls, what is the difference between a boy's and a girl's share, supposing a boy has one-fifth more than a girl? 35

4. A and B can do a piece of work in 3 days; B and C in 4 days; A and C in 5 days. In what time can the work be done (*a*) working together, (*b*) working separately? 35

5. What fraction of 1 ac. 2 rds. 33 pls. is $\frac{1}{10}$ of the difference between 10 acres and 1 rood? 30

Third Year—Boys.

(Answer Question 2 and two others only.)

1. How much money must I invest in the 4¼ per cents. at 102 in order to have an income of £365 2s. 6d., after paying an income-tax of 7d. in the £? 30

2. What is the square root of ⅔ to six decimal places? 35

3. Find the true discount on a bill for £1,678 8s. 4d., drawn March 6th at 7 months, and discounted on September 15th, at 5 per cent. 35

4. A merchant sells to a retailer at 60 per cent. profit, but the latter failing, he only receives 2s. 6d. in the £. Find the merchant's gain or loss per cent. 30

5. Divide £51 13s. 1d. between A, B, and C, so that B may receive ⅔ of A's share, and C ⅔ of B's share. 25

Third Year—Girls.

(Answer Question 5 and two others only.)

1. Find the value of $\cdot 285714\dot{2}$ of £30 + $6 \cdot 857142\dot{8}$ £ + $\cdot 6$ of $\cdot 714285$ of £6 + £514 8s. 6½d. + $1 \cdot \dot{3}$ of $\cdot 42857$1s. 30

2. A bankrupt's debts are £1,290. He pays first 10s. 8d. in the £, then 7s. 6d. in the £ of what is still owing. Find the loss per £ to the creditors. 30

3. The owner of ¼ of a ship of 6,000 tons burden sold $\cdot 75$ of his share for £13·750, what fraction of another of equal tonnage ought he to buy for £1716·25? 35

4. Express $2 \cdot 14\dot{5}$ of 5s. 8½d. as the decimal of $\frac{1}{17}$ of £8 7s. 2d. 20

5. If 3 men can reap 25 acres in 10 days, and the work of 2 men be equal to the work of 5 boys, how many boys must be employed to assist 4 men in reaping 52 acres, so that the work may be done in 12 days? 35

Teaching.

Number of Marks 40.

(Answer two Questions only.)

End of Second Year.

1. Explain how you would conduct a Reading lesson. What points would you notice in correcting defective enunciation? 15.

2. What apparatus would you use in teaching the Geography of Standard III? State briefly the use of each article of the apparatus employed. 20

3. If your class had become very noisy what steps would you take to recover and keep order? 15

4. How would you explain '*borrowing*' in simple subtraction? How many methods of *borrowing* do you know and which do you prefer? State fully your reasons. 20

End of Third Year.

1. What are the chief causes of disorder in a class? What means would you take to remove those causes? 15

2. What are the Code Instructions relating to Mental Arithmetic? How would you comply with them? Give 12 examples for Standard IV. 20

3. Name all the *class* subjects in the code. Which two would you select, and why? 15

4. Write notes of lessons on one of these subjects—
   (*a*) The Severn
   (*b*) The Herring
   (*c*) A Basin (*Infants*) 20.

AFTERNOON PAPER.

Algebra.

(Answer three Questions only.)

Maximum Marks 50.

Male Candidates—Third Year.

1. Resolve into factors:—
$a^2 - a - 20$; $a^2 + 2a - 35$; $a^2 - 10a + 24$; $a^4 - b^4$ 10.

2. Find the L.C.M. of $x^3 - x$, $x^2 - 1$, $x^3 + 1$. 10.

3. Simplify $x - \left[x - \left\{ x - (x - \overline{x - 1}) - x \right\} - x \right]$ 6

And also $\left(\frac{a+n}{a-n} - \frac{a-n}{a+n} - \frac{4n^2}{a^2 - n^2} \right) \frac{a+n}{2n}$ 10.

4. Solve:— (1) $\frac{6x+7}{15} - \frac{2x-2}{7x-6} = \frac{2x+1}{5}$ 12

(2) $2x - \frac{19 - 2x}{2} = \frac{2x - 11}{3}$ 12

Mensuration.

(Answer one Question only.)

Maximum Marks 20.

1. If a man takes 15 minutes to walk round a square field, how long will it take him to walk across it from corner to corner at the same rate? Give your answer correct to the nearest second. 20

2. Find the area of a triangle whose sides are 7, 11, 12 feet respectively. Give answer correct to 3 places of decimals. 20

Euclid.

(Answer two Questions only.)

Maximum Marks 50.

1. Define a *Circle*.

What is the sum of the three angles of any triangle? Prove your statement. How many acute angles *must* there be in every triangle? Prove your reply. 20

2. If a point is taken in a straight line, and from it another line is drawn in any direction different from that of the first, prove that the two angles thus formed are together equal to two right angles. 20

3. Describe a Circle which shall pass through two given points, and have its centre in a given line. 30

Geography.

Maximum Marks 80.

(Answer the Fourth Question and two others only.)

FIRST YEAR.

1. Name our Australian colonies, with chief towns and productions of each. 25

2. Enumerate the islands of Scotland, with any details you know about them. 15

3. Describe in words the river St. Lawrence or the Canadian Pacific Railway. 25

4. Draw a map of Ireland showing its physical features. 30

SECOND YEAR.

1. Name the mineral and vegetable products of Spain and the localities whence they are obtained. 25

2. Describe a voyage from Southampton to Malta. 15

3. Describe in words the course of the Danube or Rhine. 25

4. Draw a map of Italy showing the principal physical features and the 12 most important towns. 30

THIRD YEAR.

1. Name the British possessions of Africa with their chief products. 25

2. Tell all you know about the Gulf stream. 15

3. Where are the following, and for what are they famous—Simla, Mecca, Lucknow, Teheran, Tokio, Kyber Pass, Goa, Hong Kong? 25

4. Draw a map of India showing rivers, mountains, and chief towns. 30.

History.

Maximum Marks 80.

(Answer three Questions only.)

FIRST YEAR.

1. '*The real conqueror of Britain was Julius Agricola.*' What foundation is there for this statement? 25

2. Explain the following terms:—Bretwalda, Danelagh, Danegelt, Witanagemote, and Weregild. 25

3. What important events occurred in the following years—787, 863, 878, 901, 937, 1002? 25

5. What advantage did the Britons gain from the Roman Occupation? 30

SECOND YEAR.

1. Give the date and chief clauses of the Constitutions of Clarendon. 25

2. On what grounds did Edward III. claim the French Crown? Give (with dates) the chief events of the war with France in his reign. 25

3. Write a brief account of any three of the following:—Lanfranc, Becket, Hubert de Burgh, Piers de Gaveston, and Geoffrey Chaucer. 25

4. '*The Wars of the Roses shattered Feudalism and benefited Commerce.*' Explain this statement as fully as possible. 30

THIRD YEAR.

1. Give the Genealogy of Lady Jane Grey. What were the claims urged on her behalf? 25

2. '*There never came together so splendid a galaxy of great writers as that which shone in London in 1590.*' Who were they, and what did they write? 25

3. What were the Ulster Plantations? How did the land fall to the English Crown, and how were they protected? 30

4. Name the various Acts forming the Clarendon Code. Give the dates and purpose of each. 25

Needlework.

(One hour allowed.)

Maximum Marks 60.

(Answer one Question only.)

STANDARD VI.—Join together, by seaming and felling, two pieces of calico (seam 1 inch long) and set in a gusset. 60

STANDARD VII.—Make a calico band 3 inches in length; hem, whip, and set on a frill 6 inches long and 1 inch wide. 60

FIRST YEAR.

1. Cut out and tack together a paper pattern of a chemise (full size) for a child 8 years of age, and knit the heel of a boy's stocking. 60

2. Fix a hem ¼ inch deep and 9 inches long, fix 2 tucks the same length, and show a specimen of hemming and running. 60

SECOND YEAR.

1. Set in and complete a print patch 2 inches square. Cast on 15 loops, and knit 15 rows, showing 2 decreasings on each side of a seam stitch as for the back of a stocking. 60

2. Draw to scale on sectional paper the yoke and collar of a woman's night-dress, and make a button-hole in calico. 60

THIRD YEAR.

1. Take a piece of flannel 4 inches square, herringbone two sides, and bind two sides with flannel binding, showing a corner. 60

2. Cut out and tack together a paper pattern of one leg of a child's pair of drawers. Show on calico how you would strengthen the side opening of a child's drawers. 60

Penmanship.

Maximum Marks 40.

FIRST, SECOND, AND THIRD YEARS.

Write in large hand the word '*Ethnological*,' and in small hand '*I must finish my journey alone.*'

Answers to the Mathematical Questions will be given next month.

(*For Correspondence, see end of Certificate Article.*)

QUERY COLUMN.

Algebra.

AMATEUR.—I. Solve:—

$$2x - \sqrt{x^2 + 4} = 3.$$

And, after solving the equation, show by direct substitution that one of the values which you have found satisfies the equation.

(*Science and Art Department, Second Stage, 1889.*)

II.—If the triplicate ratio of x to $x + y$ is 1 to 1·728, what is the ratio of x to y? (*Second Stage, 1889.*)

I.—

$$2x - \sqrt{x^2 + 4} = 3$$
$$2x - 3 = \sqrt{x^2 + 4}$$
$$4x^2 - 12x + 9 = x^2 + 4$$
$$3x^2 - 12x = -5$$
$$x^2 - 4x = -\tfrac{5}{3}$$
$$x^2 - 4x + 4 = 4 - \tfrac{5}{3}$$
$$= \tfrac{7}{3}$$
$$x - 2 = \pm\sqrt{\tfrac{7}{3}}$$
$$\therefore \underline{x = 2 \pm \sqrt{\tfrac{7}{3}}}.$$

Take the value $x = 2 + \sqrt{\frac{7}{3}}$.

Then $2x - \sqrt{x^2 + 4}$

$$= 2(2 + \sqrt{\tfrac{7}{3}}) - \sqrt{(2 + \sqrt{\tfrac{7}{3}})^2 + 4}$$
$$= 4 + 2\sqrt{\tfrac{7}{3}} - \sqrt{4 + 4\sqrt{\tfrac{7}{3}} + \tfrac{7}{3} + 4}$$
$$= 4 + 2\sqrt{\tfrac{7}{3}} - \sqrt{\tfrac{31}{3} + 4\sqrt{\tfrac{7}{3}}},$$

Suppose $\sqrt{\frac{31}{3} + 4\sqrt{\frac{7}{3}}} = \sqrt{x} + \sqrt{y}$ (1)

Then $\sqrt{\frac{31}{3} - 4\sqrt{\frac{7}{3}}} = \sqrt{x} - \sqrt{y}$ (2)

Multiplying the two equations together—

$$\sqrt{(\tfrac{31}{3})^2 - 16 \times \tfrac{7}{3}} = x - y$$
$$\sqrt{\tfrac{961}{9} - \tfrac{112}{3}} = x - y$$
$$\sqrt{\frac{961 - 336}{9}} = x - y$$
$$\sqrt{\tfrac{625}{9}} = x - y$$
$$\therefore \underline{\tfrac{25}{3} = x - y}.$$

Squaring (I) :—

$$\tfrac{5}{8} + 4\sqrt{\tfrac{1}{8}} = x + y + 2\sqrt{xy} \quad \therefore \underline{x + y = \tfrac{5}{8}}.$$

$$\left.\begin{aligned} x + y &= \tfrac{5}{8} \\ x - y &= \tfrac{3}{8} \end{aligned}\right\}$$

$$2x = \tfrac{8}{8}, \therefore x = \tfrac{4}{8};$$

$$2y = 2, \therefore y = 1.$$

$$\therefore \sqrt{\tfrac{5}{8} + 4\sqrt{\tfrac{1}{8}}} = \sqrt{\tfrac{4}{8}} + \sqrt{1}$$

$$= 2\sqrt{\tfrac{1}{8}} + 1,$$

$$\therefore \text{Equation} = 4 + 2\sqrt{\tfrac{1}{8}} - (2\sqrt{\tfrac{1}{8}} + 1)$$

$$= 4 + 2\sqrt{\tfrac{1}{8}} - 2\sqrt{\tfrac{1}{8}} - 1$$

$$= \underline{3}.$$

II.—$x^3 : (x + y)^3 :: 1 : 1{\cdot}728$,

$\therefore x : x + y :: \sqrt[3]{1} : \sqrt[3]{1{\cdot}728}$

$:: 1 : 1{\cdot}2$,

$x : x + y - x :: 1 : 1{\cdot}2 - 1$

$\therefore x : y :: 1 : {\cdot}2$

$:: 5 : 1.$

COVENTRY.—Give the rule for the calculation of 'Rebate' on instalments not yet due on goods sold on the purchase and hire system.

The following formula is calculated, allowing compound interest—

Let P = Present value in pounds,

Let A = Amount of each instalment in pounds,

Let R = Amount of one pound for each period of payment,

And let n = Number of instalments.

The present value of A due at the end of the first payment $= \frac{A}{R}$

" " " second payment $= \frac{A}{R^2}$,

" " " third payment $= \frac{A}{R^3}$,

etc.

$$\therefore P = \frac{A}{R} + \frac{A}{R^2} + \frac{A}{R^3} + \ldots + \frac{A}{R^n}$$

$$= \frac{\frac{A}{R}\left(1 - \frac{1}{R^n}\right)}{1 - \frac{1}{R}}$$

$$= \frac{A\left(1 - \frac{1}{R^n}\right)}{R - 1}$$

N.B.—You will see that the formula you give is incorrect.

If simple interest is calculated, then

$$P = \frac{A\left\{n + \frac{1}{2}n(n-1)r\right\}}{1 + nr}$$

where r denotes the interest of one pound for each period of payment.

CELIA.—Give the rule for resolving such expressions as the following into factors :—

(*a*) $6x^2 - xy - 12y^2$

(*b*) $9a^2 - 3ab - 2b^2$

(*c*) $3x^2 - 4x - 15$.

RULE.—(1) Choose factors of the coefficients of the first and third terms, and place them at the corners of a cross to obtain the cross products.

(2) If the sign of the third term is plus, we must add the cross products ; if it is minus, we must subtract them.

(3) If the third term is plus, the sign of the second term determines the sign of the second terms in the factors.

(4) If the third term is minus, one of the second terms in the factors will be plus, and the other will be minus, the signs being determined by the second term in the expression.

Take the examples given—

(*a*) $6x^2 - xy - 12y^2$.

Factors of the coefficients of the first and third terms are 3 and 2, and 4 and 3. Let us try these.

$_2{}^3\!\times\!{}^4_3$ The sign of the third term being minus shows that we must subtract the cross products.

Now $3 \times 3 - 4 \times 2 = 1$, and as this gives the coefficient of the middle term, it shows that the factors we have chosen are correct.

Now to determine the signs of the second terms of the factors, we find that the sign of the second term of the expression is minus, and this shows that the product of 3 and 3 must be minus, and that of 2 and 4 must be plus.

$\therefore$ Factors of $6x^2 - xy - 12y^2 = (3x + 4y)(2x - 3y)$.

(*b*) $9a^2 - 3ab - 2b^2$.

Factors of $9 = 3$ and 3,

Factors of $2 = 2$ and 1.

$_3{}^3\!\times\!{}^2_1$ Now $3 \times 2 - 3 \times 1 = 3$, and therefore these factors are correct. The product of 3 and 2 must be minus.

$\therefore$ Factors of $9a^2 - 3ab - 2b^2 = (3a + b)(3a - 2b)$.

(*c*) $3x^2 - 4x - 15$.

Factors of $3 = 3$ and 1,

Factors of $15 = 5$ and 3.

$_1{}^3\!\times\!{}^5_3$ Now $3 \times 3 - 5 \times 1 = 4$, and therefore these factors are correct. The product of 3 and 3 must be minus.

$\therefore$ Factors of $3x^2 - 4x - 15 = (3x + 5)(x - 3)$.

BUZZARD.—Solve :—

(*a*) $\sqrt{4x + 1} - \sqrt{x + 3} = 2$.

(*b*) $\sqrt{7x + 1} - \sqrt{3x + 10} = 1$.

(*a*) $\sqrt{4x + 1} - \sqrt{x + 3} = 2$.

Squaring each side—

$$4x + 1 - 2\sqrt{(4x + 1)(x + 3)} + x + 3 = 4$$

$$5x + 4 - 2\sqrt{4x^2 + 13x + 3} = 4$$

$$5x = 2\sqrt{4x^2 + 13x + 3}$$

$$25x^2 = 4(4x^2 + 13x + 3)$$

$$= 16x^2 + 52x + 12$$

$$9x^2 - 52x = 12$$

$$x^2 - \frac{52x}{9} = \frac{4}{3}$$

$$x^2 - \frac{52x}{9} + \left(\frac{26}{9}\right)^2 = \frac{4}{3} + \frac{676}{81} = \frac{108 + 676}{81} = \frac{784}{81}$$

$$x - \frac{26}{9} = \pm\frac{28}{9}$$

$$x = \pm\frac{28}{9} + \frac{26}{9}$$

$\therefore \underline{x = 6, \text{ or } -\tfrac{2}{9}}$.

(*b*) $\sqrt{7x + 1} - \sqrt{3x + 10} = 1$

$$\sqrt{7x + 1} = 1 + \sqrt{3x + 10}$$

Squaring each side—

$$7x + 1 = 1 + 2\sqrt{3x + 10} + 3x + 10$$

$$4x - 10 = 2\sqrt{3x + 10}$$

$$2x - 5 = \sqrt{3x + 10}$$

$$4x^2 - 20x + 25 = 3x + 10$$

$$4x^2 - 23x = -15$$

$$x^2 - \frac{23x}{4} = -\frac{15}{4}$$

$$x^2 - \frac{23x}{4} + \left(\frac{23}{8}\right)^2 = \frac{529}{64} - \frac{15}{4} = \frac{529 - 240}{64} = \frac{289}{64}$$

$$x - \frac{23}{8} = \pm\frac{17}{8}$$

$$x = \pm\frac{17}{8} + \frac{23}{8}$$

$\therefore \underline{x = 5, \text{ or } \tfrac{3}{4}}$.

LARTIUS.—Show that when the sum of all the numbers, that can be formed of the four same different digits, is divided by the sum of the digits, the quotient is 6666 ; and prove that if any four consecutive odd numbers be multiplied together, and 16 be added to them, the result is an exact square.

(*Mathematics, Honours, Stage III.*)

(1) Let a, b, c, and d, be the four digits.

The different numbers represented when a is in the thousands' place are :—

$$\begin{array}{r} 1000a + 100b + 10c + d \\ 1000a + 100b + c + 10d \\ 1000a + 10b + 100c + d \\ 1000a + 10b + c + 100d \\ 1000a + b + 100c + 10d \\ 1000a + b + 10c + 100d \\ \hline \text{Sum of the numbers} \quad 6000a + 222b + 222c + 222d \end{array}$$

The sum of the numbers when b is in the thousands' place—
$= 222a + 6000b + 222c + 222d.$
The sum of the numbers when c is in the thousands' place—
$= 222a + 222b + 6000c + 222d.$
The sum of the numbers when d is in the thousands' place—
$= 222a + 222b + 222c + 6000d.$
∴ Total sum of all the numbers formed with the four digits—
$= 6666a + 6666b + 6666c + 6666d = 6666\ (a + b + c + d)$;
∴ If the sum be divided by the sum of the digits the quotient is 6666.

---

(2) Let x = any odd number,

Then x, $x + 2$, $x + 4$, $x + 6$, are four consecutive odd numbers—

$$\begin{aligned} & x\,(x + 2)\,(x + 4)\,(x + 6) + 16 \\ &= x\,(x + 2)\,(x^2 + 10x + 24) + 16 \\ &= x\,(x^3 + 12x^2 + 44x + 48) + 16 \\ &= x^4 + 12x^3 + 44x^2 + 48x + 16\,; \end{aligned}$$

$$x^4 + 12x^3 + 44x^2 + 48x + 16\ (x^2 + 6x + 4$$

x^4

$2x^2 + 6x$ | $12x^3 + 44x^2$
$12x^3 + 36x^2$

$2x^2 + 12x + 4$ | $8x^2 + 48x + 16$
$8x^2 + 48x + 16$

∴ We thus see that if 16 be added to the product of any four consecutive odd numbers, the result is an exact square.

CELIA.—Simplify :—

$$\frac{x^p\,(q + r)}{x^q\,(r - p)} \times \frac{x^q\,(r + p)}{x^r\,(p - q)} \times \frac{x^r\,(p + q)}{x^p\,(q - r)}$$

First Method—

$$\frac{x^p\,(q + r)}{x^q\,(r - p)} \times \frac{x^q\,(r + p)}{x^r\,(p - q)} \times \frac{x^r\,(p + q)}{x^p\,(q - r)}.$$

$$= \frac{x^{pq} + pr \times x^{qr} + pq \times x^{pr} + pq}{x^{qr} - pq \times x^{pr} - qr \times x^{pq} - pr}$$

$$= \frac{x^{pq} + pr + qr + pq + pr + pq}{x^{qr} - pq + pr - qr + pq - pr}$$

$$= \frac{x^{3pq} + 2pr + qr}{x^0}$$

$$= \frac{x^{3pq} + 2pr + qr}{1}$$

$$= \underline{x^{3pq} + 2pr + qr}.\ \text{Ans.}$$

Second Method—

$$\frac{x^p\,(q + r)}{x^q\,(r - p)} \times \frac{x^q\,(r + p)}{x^r\,(p - q)} \times \frac{x^r\,(p + q)}{x^p\,(q - r)}$$

$$= \frac{x^{pq} + pr}{x^{qr} - pq} \times \frac{x^{qr} + pq}{x^{pr} - qr} \times \frac{x^{pr} + pq}{x^{pq} - pr}$$

$$= \frac{x^{pq} \times x^{pr}}{x^{qr} \div x^{pq}} \times \frac{x^{qr} \times x^{pq}}{x^{pr} \div x^{qr}} \times \frac{x^{pr} \times x^{pq}}{x^{pq} \div x^{pr}}$$

$$= \frac{x^{pq} \times x^{pr} \times x^{qr} \times x^{pq} \times x^{pr} \times x^{pq}}{x^{qr} \times \frac{1}{x^{pq}} \times x^{pr} \times \frac{1}{x^{qr}} \times x^{pq} \times \frac{1}{x^{pr}}}$$

$$= \frac{x^{pq} \times x^{pr} \times x^{qr} \times x^{pq} \times x^{pr} \times x^{pq}}{1}$$

$$= x^{pq} + pr + qr + pq + pr + pq$$

$$= \underline{x^{3pq} + 2pr + qr}.\ \text{Ans.}$$

Arithmetic.

T. J. M.—If I subtract from any number, *e.g.*, 78579632, the same digits in another order, *e.g.*, 23695787, I am sure to find a remainder consisting of an exact number of nines, and having the sum of its digits a multiple of 9.

Show this to be true, and explain the reason why it must be true. (*Certificate 1887—Second Year—Females.*)

$$\begin{array}{rl} 78579632 = & (\text{A multiple of } 9) + 2 \\ 23695787 = & (\text{A multiple of } 9) + 2 \\ \text{(Subtracting) } \underline{54883845} = & \underline{(\text{A multiple of } 9)} \end{array}$$

Both the original number and the number formed by the digits placed in another order, and the sum of the digits, give a multiple of 9 with remainder 2.

∴ Difference and sum of digits of difference give a multiple of 9.

A. LORIMER.—A bottle of brandy holds 12 wine-glassfuls. A dishonest butler takes a wine-glassful out every day, and fills up the bottle with water. In how many days will the mixture be about half and half?

$$\begin{array}{lll} \text{Quantity of brandy left after 1st time} & = & \frac{11}{12}, \\ \text{,, ,, ,, 2nd ,,} & = & \frac{11}{12} \text{ of } \frac{11}{12} \\ & = & \frac{11^2}{12^2} \\ & = & \frac{121}{144}, \\ \text{,, ,, ,, 3rd ,,} & = & \frac{11^3}{12^3} \\ & = & \frac{1331}{1728}, \\ \text{,, ,, ,, 4th ,,} & = & \frac{11^4}{12^4} \\ & = & \frac{14641}{20736}, \\ \text{,, ,, ,, 5th ,,} & = & \frac{11^5}{12^5} \\ & = & \frac{161051}{248832}, \\ \text{,, ,, ,, 6th ,,} & = & \frac{11^6}{12^6} \\ & = & \frac{1771561}{2985984}, \\ \text{,, ,, ,, 7th ,,} & = & \frac{11^7}{12^7} \\ & = & \frac{19487171}{35831808}, \\ \text{,, ,, ,, 8th ,,} & = & \frac{11^8}{12^8} \\ & = & \frac{214358881}{429981696}, \\ \therefore \text{Time} = \underline{8} \text{ days. Ans.} & = & \frac{1}{2} \text{ nearly.} \end{array}$$

J. P. H.—200 coins consist of guineas, half-sovereigns, and half-crowns; the values of the guineas, half-sovereigns, and half-crowns are as 14 : 8 : 3. Find the number of guineas. (*Lock.*)

Number of guineas—

$$= 200 \times \frac{14 \times \frac{1}{21}}{(14 \times \frac{1}{21}) + (8 \times \frac{1}{10}) + (3 \times \frac{1}{5})}$$

$$= 200 \times \frac{\frac{2}{3}}{\frac{2}{3} + \frac{4}{5} + \frac{3}{5}}$$

$$= 200 \times \frac{\frac{2}{3}}{2\frac{2}{3}}$$

$$= 200 \times \frac{2}{8}$$

$$= 200 \times \frac{1}{4}$$

$$= \underline{50}.\ \text{Ans.}$$

HODIE.—A man bought 100 quarters of wheat, and sold part at a profit of 8 per cent. and part at a loss of 2 per cent. On the whole he gained 5 per cent. If the whole sold for £210, what was the cost of the wheat, and how many quarters were sold at a loss?

Difference on £100 between gain of 8 per cent. and loss of 2 per cent. = £10,

Difference on £100 between gain of 8 per cent. and gain of 5 per cent. = £3,

∴ Amount of £100 on which 2 per cent. is lost = $\frac{1}{10}$ of £100 = £30.

Cost price of the wheat = £210 × $\frac{100}{105}$ = £200,

,, per quarter = £200 ÷ 100 = £2,

,, of the wheat on which 2 per cent. is lost = £30 × 2 = £60,

∴ No. of quarters sold at a loss = £60 ÷ £2 = 30. Ans.

LONDON MATRICULATION.

JANUARY, 1893.

OUR PREPARATION CLASS FOR PRIVATE STUDENTS.

BY T. RUSSELL MALTBY, M.A.
Kingswood School, Bath.

(FOURTH MONTH.)

WE advise our readers to study with care the Model Answers to Matriculation Questions which will appear for the next month or two. Their value, which will be best appreciated by candidates who have attempted formal answers, consists not only in their character as specimen-answers, but in the guidance they afford as to the style and scope of the papers set by the London examiners.

I.—LATIN.

Notes on September Work.

Allen's Grammar, Sects. 154-163.

(1) For full notes on these sections we must refer our readers to the PRACTICAL TEACHER for November, 1891, and May, 1892.

(2) Sect. 154. It must be remembered that the rules of gender according to *meaning* have precedence of the rules of gender according to *termination*; *e.g.*, *Jura* is masculine, *Cyprus* is feminine.

(3) Sect. 155 (*c*). All nouns in *-or*, *-ōris*, are masculine, except *soror*, *sister*, and *uxor*, *wife*.

(4) Except in monosyllables, *-us* of the 3rd declension is generally a feminine termination.

(5) Sect. 155 (*d*). Note the three 4th declension feminines *nurus*, *socrus*, *ānus* (daughter-in-law, mother-in-law, old woman). *Socrus* was originally also masculine, *a father-in-law*.

(6) Locative endings:—

	1st Decl.	2nd Decl.	3rd Decl.	4th Decl.	5th Decl.
Sing.	*-ae*	*-i*	*-i* (*e*)	*-ui*	*-e*
Plur.	*-is*	*-is*	*-ibus*		

The only locative form of the 4th declension is the rare word *domui*, *domi* (2nd decl.) being the usual form. The 5th declension locative is found chiefly in certain adverbs and expressions of time, as, *hodie*, *pridie*, etc., but there is good authority for *die quinti*, *die proximi*.

(7) The masculine genitive singular of adjectives in *-ius* ends in *-ii* and the vocative in *-ie*, not in *-i*, as in nouns. But remember *meus*, voc. *mi*.

(8) Sect. 163 (*a*) and (*b*). The dictionary must be freely consulted here.

Allcroft and Haydon, Sects. 135-193.

(1) For revising the Syntax of the cases, Allen, Sects. 101-131 is more convenient.

(2) A and H., Sect. 151. Candidates should add largely to the list of prepositional phrases, in view of questions, like the sixth in the second June paper. Compare Allen, Sects. 304-390.

(3) A. and H., Sect. 154. *Never make a mistake about se.*

(4) The following are more complete lists of correlative adjectives (pronominal) and adverbs; we leave our readers to assure themselves of the meaning of each word:—

DEMONSTRATIVE.	RELATIVE.	INTERROGATIVE.	INDEFINITE RELATIVE.	INDEFINITE.
is	*qui*	*quis?*	*quisquis* / *quicunque*	*aliquis* / *quis*
tantus	*quantus*	*quantus?*	*quantuscunque*	*aliquantus* / *quantuslibet*
talis	*qualis*	*qualis?*	*qualiscunque*	*qualislibet*
tot (indecl.) / *totidem*	*quot* (indecl.)	*quot?*	*quotquot* / *quotcunque*	*aliquot*
tam	*quam*	*quam?*	*quamquam* / *quamcunque*	*quamvis* / *quamlibet*
tot ies	*quoties*	*quoties?*	*quotiescunque*	*quotieslibet* / *aliquoties*
ita / *sic*	*ut*	*ut?*	*utcunque*	
ibi	*ubi*	*ubi?*	*ubicunque*	*alicubi*
eo	*quo*	*quo?*	*quoquo*	*aliquo*
ea	*qua*	*qua?*	*quaqua*	*aliqua*
inde	*unde*	*unde?*	*undecunque*	*alicunde*
tum	*cum*	*quando?*	(*cumcunque*)	*aliquando*

Horace, Odes III., 21-30 (Page). *Supplementary Notes. Ode 21.* 1. *Thou that wast born with me when Manlius was consul.* 2. *Geris: bringest.* 3. *Pia testa:* untranslateable (see note); Wickham says '*gentle winejar*,' others *kindly*, *gracious*, *good*. 6. *Digna* (voc.) *moveri:* what is the regular prose construction? See *A. and H.*, sect. 285. 7. *Promere:* to be taken after *iubente; come down, since Corvinus bids me broach mellower wines.* 11. *Even old Cato for all his virtue is said . . .* 21. *Laeta:* atque ideo propitia (Or.); *if she will come with smiles.* 22. *Segnesque nodum solvere*: cf. Ode 19. 16; the Graces spent their lives together with hands clasped. 23. Notice this indicative with *dum; A. and H.*, sect. 293. Account for the ablatives *Manlio*, *nomine* (attendant circumstance), *die*, *sermonibus*, *mero*, *Lyaeo* (instr.); what is the force of the prefix in *retegis?*

Ode 22. 4. *Goddess of threefold form.* 6. *That I may . . present it . . . with the blood of a boar . . .* Look up the constructions of *dono*.

Ode 23. 8. *Pomifero anno:* abl. abs. 9. *For the victim that is feeding on . . . or fattening among . . . shall dye the axes . . .* Decline *Phidyle*, *thure*, *fruge*, *rore*, *farre*. Make a note of the teaching of this Ode.

Ode 24. 1. *Though you were wealthier . . . and overspreading . . .; licet: A. and H.*, sects. 70, 264. 7. *Loose from fear . . . from the snares of death.* 9. *Campestres: of the steppes;* understand *vivunt*. 14. *Culturā, annuā: nor does a longer tillage than one year's please them, and when a man has fulfilled his toil a successor relieves him on the same terms.* 19. *Dotata: on the strength of her dower* (W.) 20. *Fidit: gives her confidence to.* 21. *Their great dowry is . . .* 22. *Metuens:* adj. not participle, hence the genitive not the accusative. 24. 'They dare not sin, or if they sin they die' (Con.) 26. *Civicam: of citizen against citizen.* 30. *Sure to win fame among posterity, since . . .* 33. Understand *proficiunt*. 39. *Snows grown hard upon the ground.* 45. *Let us either into the Capitol . . . or into the nearest sea send the gems . . . if our repentance is true.* 51. *Cupidinis pravi:* note the gender. 58. *Or, if you prefer, with the dice forbidden by law: malis:* subj. like *iubeas*. 60. *Deceives his partner and his friend, and hastes to make money for . . .* 64. *Nescio quid: A. and H.*,

sect. 229. Can you reproduce in substance this Ode and the first six?

Ode 25. 1. *Whither art thou carrying me filled with thyself?* 2. *Nemora: in* must be supplied from the following noun *specus.* 5. Observe that Page's note takes *aeternum* predicatively. 7. Literally, *I shall say (something) notable. . . .* 8. *Non secus: even so.* 12. *As 'tis a joy to me, as I stray, to view with wonder the river-banks and solitary grove.* 15. *And of the Bacchantes strong to overthrow with their hands the towering ash-trees.* Study the word *meditor:* distinguish *consilium* and *concilium:* explain all the ablatives and the genitive *Natadum.*

Ode 26. 6. *Ponite:* addressed to the attendants. 7. 'Links, crowbars, and artillery' (Con.) 8. *O, goddess who dost govern. . . .* 12. *Semel: just once.*

Ode 27. This is a more difficult Ode, and should be very carefully done. 1. *Let wicked men be attended by . . .* 6. What is the case of *sagittae?* 7. The order is, *ego, providus auspex, corvum suscitabo, antequam avis repetat paludes, ei cui timebo.* The poet has his fears about such a voyage as she contemplates, but he will endeavour to bring about favourable omens for her. 18. What is the allusion? 29. *But lately in the meadows intent upon flowers, and busy over a garland due to the nymphs.* 51. *Audis:* second person by attraction. 58. *You have the power, with the girdle that luckily has come with you, to break your neck suspended from this mountain-ash.* 65. And, as *pellex,* to be handed over to . . . 67. Why is the bow unstrung? 69. *Abstineto, reddet:* both future; *you will have to refrain when.* 70. The genitives are in imitation of the Greek.

Ode 28. 2. *Faciam:* subj. 3. *Strenua:* closely with *prome; be smart and broach.* 4. *Sapientiae:* why dat.? 11. *Recines:* of an *answering* song; in the last Ode of a *repeated* song. 13. *At the close of our song we will sing of her who. . . .* 16. *Night also shall be celebrated in a hymn she well deserves.*

Ode 29. Prepare a somewhat full account of Maecenas. 1. *For thee mellow wine in a cask not yet tilted, with blossom of roses and balsam expressed to grace thy locks has long been waiting in my house.* 5. *Iamdudum . . est:* A. and H. Sect. 199; *morae:* A. and H. Sect. 42 (i.) 13. *A change of life has oft been welcome to the rich.* 14. *Mundae cenae: suppers of neat simplicity.* 17. *Andromeda's bright sire.* 20. *Siccos: sultry.* 25. *But thou art pondering what condition best becomes the state.* 32. *Trepidat: frets; quod adest: obj.* of *componere.* 33. *Aequus:* adverbially; *like a river that now in mid channel peacefully glides down. . . .* 44. *Occupato:* imperative. 49. *Delighting in her cruel work and persistent in playing her wanton game; ludere:* infinitive explanatory of the adjective *pertinax;* so *spernere fortior* (3. 50), *segnes solvere* (21. 22); this usage is not allowed in prose. 53. *I praise her while she stays.* 56. *Quaero:* *vvo.* 62. *Safe sheltered in my two-oared skiff.*

Ode 30. 6. *I shall not wholly die.* 8. *As long as pontiffs with silent virgins shall climb the Capitol.* 11. *Aquae:* gen., Allen § 129 (*h*). 13.—

> First of his race to wed the Æolian lay
> To notes of Italy. Put glory on,
> My own Melpomene, by genius won,
> And crown me of thy grace with Delphic bay.
> —*Conington.*

Latin Course for October.

1. *Allen's Grammar, Sects. 164-208.*

2. *Allcroft and Haydon, Sects. 194-259.*

3. *Allcroft and Haydon, Exercises X.-XVI.,* omitting XC., XIVC., XVC., XVIC.

4. *Horace, Odes IV. Carmina I.-VIII.* Make a written translation.

II. GREEK.

Notes on September Work.

Heracleidae, 461-645 (Jerram). *Supplementary Notes.*

462. *For it might perhaps be a gain to us, but still . . .* 468. *For well-born youths, increasing in years and mindful of their fathers' wrongs, are dangerous to their enemies.* 466. Make a note of the phrase τί πλέον ἐστὶν ἐμοί; 470. *And against all this he must needs . .* 477. ἥσυχον: an adj. of two terminations; the subject (understood) of *μένειν* is fem. 479. If the first interpretation be taken, *γένους* is gen. after a verb, implying *rule, command,* etc.; if the second, *γένους* is gen. of *relation, with respect to the family.* 480. πως: *in some wise.* 484. *It is not a new thing that I have justly to praise thee most of . .* 487. *Hath fallen back again into perplexity;* μετά denotes *change.* 489. πέρι: account for the accent; so ὕπερ in 532. 490. ἦτις: supply the right part of εἰμί. 491. *If we are still to live;* literally, *if it is necessary for us to exist.* 502. παρίστασθαι: *put oneself by the side of, stand ready for, submit to.* 506. The meaning is somewhat involved; σεσῶσθαι is passive, and its subject is indefinite; *if when it is possible (for us all) to be saved (by the death of one), we shun death (on behalf of that one).* 508. *That we should groan sitting here as suppliants of the gods, and being born of such a father as we are, should be seen to be cowards.* 511. τῆσδε πολέως ἀλούσης: gen. abs.; πεσεῖν: subject ἐμέ. 515. ἀλητεύσω: deliberative subjunctive (so Jerram's note) or future indicative. 517. Those who cling to life cannot expect others to risk their lives for them. 520. *If these die while I myself am preserved.* 523. *Either to have me, a lonely maiden, for his wife, or . .* 525. *'Tis better then for me to die than meet with such treatment when I am unworthy of it, when I deserve it not.* 527. τάδε: such treatment. 528. (ἐκεῖσε) ὅπου. 530. πάρα: πάρεστι, hence the accent; *is in your hands.* 533. The meaning seems to be, *By not loving my life I have found a most glorious thing to find,* and the use of μή is irregular. 536. πάρος: compare the meanings in 57 (πάροιθεν), 200, 583, 1031. 540. *But thou, the offspring of that soul divine, art born of that famous one, even Heracles.* 542. τῇ τύχῃ: the ill-fortune that occasions them. 543. *I will tell you a way in which.* 545. κᾆθ' = καὶ εἶτα; ἡμή in 583 = ἡ ἐμή. 547. Optative with ἄν, as in 344, equivalent to a future; λαχοῦσα: without article, *if I obtain the lot by chance.* 548. μὴ λέξῃς: Synt., sect. 146. 549. ἐνδέχεσθε (με). 553. τοῦ πρίν: *than the former one,* Synt. 57 and 23. 556. ἀπεννέπω: what is the force of the prefix? 558. μιασμάτος τοῦ ἐμοῦ: *the pollution of my death.* 559. θάνω: note this jussive subjunctive. 560. σῇ ἐνθανεῖν χερί: *die in thy hands.*

561. *Do thou be present and . .* 563. οὔπερ εὔχομαι (πεφυκέναι). 565. τοῦδε: from Demophon here. 569. *Both for your noble spirit and for justice' sake.* 577. πειρῶ: imperat. mid. 578. *To thee we are as children, by thy hands . . .* 582. Synt. 148. 583. ὅσων: governed by πάροιθε; supply antecedent πάντα. 587. ἐκ: of the agent, see lexicon. 588. *Remember how you must bury your saviour; it were right to do it most honourably.* 593. *Howbeit may there be nothing! For if we mortals who are just about to die are to have cares even yonder . .* 595. τρέψεται: Synt. 162. 597. *Thou that art most conspicuous in courage.* 599. πολύ: adv. with τιμιωτάτη. 602. οἰχόμεσθα: plur. for sing., as in 632, 636, etc. 605. *Since I take no pleasure in this that is done and yet, if the oracle were unfulfilled . . .* 607. συμφορά: the noun; *but even this is a disaster.* 611. *But one kind of fortune presses hard upon another.* 613. βραχύν: predicative; *(brings down) into lowliness.* 621. *For glorious is the portion of death which the unhappy maiden accepts.* 626. The subject is τάδε. 630. Ἰόλεως: nom. 631. *Where is he distant from this seat? i.e., at what distance is he from this seat.* 632. γε always emphasises the word which precedes it; what is the literal translation here? 640. νῷν: dual, Alcmena and myself; βλάβης: *from hurt.* 644-5. Prepare these lines thoroughly; *for thou hast long been in sore distress and pined in thy heart (to know) whether the arrival of those who have come hither would come to pass.* Explain all genitives and optatives; study the meanings of particles; parse the following:—χρεών, πλέως, πύθεσθαι, μεθέστηκ', σφάξαι, κάχόμεσθα, ἀξιοῖ, ἀλούσης, ἕξιτε, θάνω, παρεστάναι, πειρῶ, ἴσθι, ζῶσ', κατῆρκται, κρανθέντοι, κεῖς, βεβάναι, ἐρείσατε, ἀπώσεται, ὑπεράλγει, κεῖσαι, ἐρρώμεθα, ἐτήκον.

Greek Course for October.

1. *Abbott and Mansfield, Sects. 153-173, and revision on verbs in -μι.*

2. *Abbott and Mansfield, Syntax, Sects. 66-141.*

3. *Heracleidae, 646-866.* Make a written translation.

4. *Translation at Sight.—Colson, Part II., No. VII.; Part III., No. VI.; Part IV., Nos. VIII., XI., XII.* Written work.

II. FRENCH.

Course for October.

1. *Breymann's Grammar, Chapters II. and III.* (Articles and Nouns.)

2. *Anecdotes Historiques et Littéraires, Livre Premier, Nos. 63 and 64; Livre Second, Nos. 32, 36, 46, 47.* Written work.

3. *Anecdotes Historiques et Littéraires, Livre Premier, Nos. 48, 72; Livre Second, Nos. 43, 45, 48, 50, 53, 54, 55.* For rapid translation.

4. *Word Lists.* See September P. T.

III. ENGLISH.

Notes on September Work.

Mason (*Verbs and Adverbs*) with *Hewitt and Beach pp. 108-211.*

(1) Sect. 183. When transitive verbs are used without an object, because their grammatical subject is logically their direct object, Sweet calls them *passival* verbs. (Ex. The book sold well.)

(2) Some verbs are used *reciprocally*. (Ex. We always quarrel when we meet.)

(3) Sect. 184. An ordinary English verb has *four* inflections. What are they?

(4) Sect. 185. In parsing and analysis it is important to distinguish *notional* from *auxiliary* verbs.

(5) Make sure of Sect. 196, and H. and B., p. 128. (Infinitive Mood.)

(6) Make a clear abstract of Sects. 210-213, 232-233 (*Shall* and *Will*). See H. and B., p. 167.

(7) Many strong verbs have become weak; notice the few weak verbs like *show, stick, wear,* which have acquired strong forms.

8. *Say*: vowel shortened in 3rd. sing., pres. as well as in preterite.

(9) *Cleave*: to divide, *clove* / (*clave*) / *cleft* — *cloven* / *cleft* / (*cleaved*)

cleave: to adhere, (*clave*) / *cleaved* — *cleaved.*

(10) *Spoil*: to mar, damage, *spoilt*. *Spoil*: to plunder, *spoiled.*

(11) *Learn*: *learnt* is the participle; *learned* is used as an adjective; so *cloven, bended,* etc. See H. and B., pp. 133-4.

(12) Sect. 231. Another peculiarity of all these verbs is that they take the negative *not* without an auxiliary in ordinary speech. Most of them also take infinitive without *to*.

(13) Two of the preterite-present verbs (*dare, owe*) have been made regular in certain meanings, two (*must, ought*) are used only in the old preterite forms, only one (*dare*) occurs in the infinitve.

(14) When has the perfect participle an active signification?

(15) What forms of *shall, will, may* are only used notionally?

English Course for October.

1. *Mason, Sects. 277-341.* Prepositions, Conjunctions, Interjections, Composition and Derivation.

2. *Hewitt and Beach, pp. 212-259 and 588-642.*

3. *Analysis and Prosody.* Occasional Practice.

4. *Ransome's History, 1603-1625, with the Geography relating thereto.*

IV. MATHEMATICS.

Notes on September Work.

Note the following methods of factorising:—

(1) $a^4 + a^2 + 1 = a^4 + 2a^2 + 1 - a^2$
$= (a^2 + 1)^2 - a^2$
$= (a^2 + 1 + a)(a^2 + 1 - a)$
$= (a^2 + a + 1)(a^2 - a + 1).$

(2) $3a^2 - \frac{1}{3} = 3(a^2 - \frac{1}{9})$
$= 3(a + \frac{1}{3})(a - \frac{1}{3})$

(3) $x^4 + y^4 - 18x^2y^2 = x^4 - 2x^2y^2 + y^4 - 16x^2y^2$
$= (x^2 - y^2)^2 - (4xy)^2$
$= (x^2 - y^2 + 4xy)(x^2 - y^2 - 4xy).$

(4) $x^3 + 9x^2 + 20x + 12$. Here the sum of the coefficients of the odd terms is equal to the sum of the coefficients of the even terms, from which we know that $(x + 1)$ is a factor; by division the other is found to be $(x^2 + 8x + 12)$, $\therefore$ the elementary factors are $(x + 1)(x + 2)(x + 6)$.

(5) $x^3 - 15x^2 + 16x - 2$. Here the sum of the coefficients of all the terms is zero, from which we know that $(x - 1)$ is a factor; and by division the other is found to be $x^2 - 14x + 2$.

Course for October.

1. *Arithmetic.* Regular practice in Matriculation questions.

2. *Algebra. Hall and Knight, Chapters XIX.-XXIII.*

3. *Euclid. Hall and Stevens, Book III., from Prop. 20, with Exercises.*

V. MECHANICS.

Wormell, Chapters IX. - XI. (Gravitation, Energy Machines).

VI. CHEMISTRY.

Kemshead, Chapters XVI.-XIX. (Sulphur, Combustion, Compounds of Carbon with Hydrogen).

VI. HEAT AND LIGHT.

Stewart, Light, Chapters I.-IV. (Introductory, Rectilinear Propagation, Photometry, Reflexion at Plane Surfaces).

—o—

SCHOLARSHIP FRENCH.

BY W. T. THOMPSON, B.A. (LOND.),

Honours at Matriculation, with Marks qualifying for Third Prize;
First Class French Honours, with Marks qualifying for the Prize;
Second Class German Honours;
Co-Director of the Birkbeck Training Classes.

[*N.B.—The rules referred to will be found in the September part of* 'THE PRACTICAL TEACHER.']

7.9.—*laisser voir à Prascovie les chagrins;* let Prascovie see the sorrows. *Laisser voir* is equal to a single verb, and as no verb can govern two objects, *à* is used before one of them.

7.10.—*le*, him. *Le* and *la* are pronouns, and respectively the direct objects of the 3rd pers. pro., masc. and fem., *when a verb immediately follows them.*

7.11.—*plus d'une fois*, more than once. *Plus* is followed by *de* (= than) when a numeral is the next word. In other cases it is followed by *que.*

7.12.—*à travers*, through.

7.12.—*fentes*, fem., plur., noun; chinks.

7.12.—*cloison*, fem., sing., noun; partition.

7.13.—*réduit*, masc., sing., noun; closet, small room.

7.17.—*depuis plusieurs mois;* several months before; lit., since several months.

7.19.—*n'avait jamais*, had never. *Jamais*, when used with a verb in the sense of *never* requires *ne* before the verb.

7.19.—*répondu*, past part. of *répondre;* answer. *Répondre* is followed by *à* in French (= answer *to*).

7.22.—*s'était chargé de*, had taken charge of. Rule E (1).

7.23.—*promis*, past part. of *promettre;* promise.

7.23.—*réclamations*, fem., plur., noun; claims.

7.24.—*auprès de*, to. This compound preposition is mostly used when the name of a person follows.

7.25.—*exilé*, an exile. It is the past part. of the vb. *exiler*, to send into exile, and means, properly speaking, 'one exiled.'

7.25.—*en*, from it. *En* is the pronoun (= of it, from it) and not the preposition (= in), *when a finite verb immediately follows it.*

7.25.—*conçu*, past part. of *concevoir*, to conceive. The *c* in the infinitive has a soft sound (like *s*) because the letter *e* follows it. To preserve this soft sound throughout the whole of the conjugation, a cedilla is placed under the *c* when the letter *u* follows it.

7.26.—*On ne lui fit pas plus de réponse*, lit. 'one made him no more answer,' that is, 'he received no more answer.'

7.27.—*auparavant*, adv. of time; before. Notice the following translations of *before* according to its different uses.

avant, prep., denoting time, *Il arriva avant une heure*, 'he arrived before one o'clock.'

devant, prep., denoting place. *Il est resté devant la maison* 'he remained before the house.'

avant que, conj., governs subj. Rule F (5). *Elle est arrivée avant que je sois parti.*

avant de, preceding the gerundial infinitive, as *avant d'oser*, 'before daring' (9.24).

7.28.—*venant*, pres. part. of *venir;* come.

7.30.—*déçue*, past part., fem., sing., of *décevoir;* deceive.

7.30.—*maux*, noun, masc., plur. of *mal;* evils.

7.31.—*accablé*, past part. of *accabler;* overwhelm.

7.33.—*revenant*, pres. part of *revenir;* return.

7.33.—*moisson*, noun, fem., sing.; harvest.

7.35.—*effrayée*, past part., fem., sing. of *effrayer;* frightened. Rule C.

7.36.—*regards*, noun, masc., plur.; looks.

7.37.—*voilà*, behold; literally, *see there*, *voi(s) là*. Similarly, *voici*, here is = lit. *see here*.

7.38.—*s'écria -t -il*, cried he.

7.38.—*la*, her. See note on 7.10.

7.38.—*vit*, pret., 3rd, sing. of *voir;* see.

7.38.—*paraître*, vb., inf. mood; appear.

7.40.—*donnée*, past. part., fem., sing. of *donner;* give. It is fem., sing., by Rule D.

8.1.—*afin que*, conj., gov. subj.; in order that.

8.1.—*souffre*, pres., subj., 1st. sing. of *souffrir;* suffer.

8.2.—*la*, her. See note on 7.10.

8.3.—*voie*, pres., subj. 1st, sing. of *voir;* see.

8.3.—*dépérir*, pine away.

8.3.—*lentement*, adv. of manner, slowly. Advs. of manner are formed from adjectives by adding *ment*. This termination is generally added to the fem., sing., of the adj., as *gracieux*, graceful; *gracieusement*, gracefully.

8.4.—*de serviles travaux*, lit. '*some* menial duties.' Do not translate *some* into English.

8.4.—*que* = *afin que*, in order that. It is frequently used instead of subordinative conjunctions to prevent their repetition.

8.5.—*bonheur*, noun, masc.; happiness.

8.6.—*soit*, pres., subj., 3rd, sing. of *être*, to be. Subj., after *afin que*. Rule F. (5).

8.8.—*épouvantée*, past. part., fem., sing. of *épouvanter;* to terrify.

8.9.—*parvinrent*, pret., 3rd, plur. of *parvenir;* succeed.

8.10.—*le*, him. See note on 7.10.

8.10.—*en mêlant leurs larmes aux siennes*, 'by mingling their tears with his.' *En* is the only preposition which can be followed by a present participle.

8.14.—*ouvertement*, adv., openly. See note on 8.3.

8.15.—*devant*, prep., before (of place). See note on 7.27.

8.16.—*désespérée*, past. part., fem., sing. of *désespérer*, to despair. Translate it 'desperate.'

8.16.—*elle put se former une idée*, lit. 'she could form to herself an idea,' *i.e.*, 'she could form an idea.' *Se former* is a verb of indirect reflexion. In other words, *se* is the indirect object of the verb. *Idée* is its direct object.

put, pret., 3rd, sing. of *pouvoir;* be able.

8.22.—*demander* is not 'to demand,' but simply 'to ask for.'

8.22.—*lui vint à l'esprit*, lit. 'came to her to the mind,' *i.e.*, 'came into her mind.' The French do not use the possessive *mon*, *ton*, but the definite article *le*, *la* when referring to parts of the body, if the context shows clearly whose body is referred to. Thus, in the present case, there is no doubt that the 'mind' (*esprit*) was that of Prascovie.

vint, pret., 3rd, sing. of *venir;* come.

8.25.—*éclair*, noun, masc., sing.; flash of lightning.

8.26.—*où*, in which.

8.26.—*achevait*, imperf., 3rd, sing. of *achever;* finish.

8.27.—*inexprimable*, adj., inexpressible; unspeakable.

8.28.—*persuadée*, past. part., fem., sing. of *persuader*, persuade. See Rule C.

8.30.—*la*, her. See note on 7.10.

8.30.—*soutint*, pret., 3rd sing. of *soutenir;* sustain.

8.30.—*dans la suite*, lit., 'in the sequel,' *i.e.*, afterwards. ♥*Suite* is a noun = 'what follows,' from the verb *suivre*, to follow.

8.31.—*milieu*, midst. The prefix *mi* = middle, *lieu* = place. Compare *mi-nuit*, midnight; *mi-di*, midday; *mi-chemin*, lit. mid-road; half way.

8.33.—*Jusqu'alors;* up to then.

8.34.—*entrée*, past part., fem., sing. of *entrer;* enter. It is fem., sing. by the operation of Rule C. *Espérance* is the nom. to the verb.

n'était point entrée, had not entered. *Entrer* is one of the verbs like *aller*, etc., which forms its compound tenses with *être*, instead of *avoir*.

Notice that *entrer* is always followed by *dans* in French, where the corresponding word 'in' or 'into' is not required in English.

8.35.—*la*, her. See note to 7.10. We have now frequently pointed out the difference between *le*, *la*, as articles and as pronouns, and shall refer less to the point in future.

8.36.—*d'une grande joie*, lit. 'with a great joy.' The 'a' is not required in English. When an abstract noun is accompanied by an adj. in French, *un* or *une* must precede the adj.

8.36.—*sachant*, pres. part. of *savoir*; to know.

Notice that *pas* is not required after *savoir*. The same is the case with the verbs *oser* (to dare), and *pouvoir*, to be able.

9.1.—Notice that 'to ask of' is in French *demander à*.

9.2.—*de ne pas la priver;* not to deprive her.

9.3.—*éprouvait*, imperf. 3rd. sing. of *éprouver;* feel, experience.

9.3.—*Ne savait définir*, 'knew not (how) to define.'

9.4.—*Bientôt;* soon. Literally it means 'very soon.' *Bien* = very, *tôt* = soon.

Remember *plutôt*, rather; *plus tôt*, sooner. *Tôt* is used alone only in the expression '*tôt ou tard*,' 'sooner or later.'

9.4.—*Cependant;* however.

9.9.—*désormais*, adv.; henceforth.

9.9.—*uniquement*, adv.; entirely. See note on 8.3.

9.10.—*lisière*, noun, fem. sing.; border, outskirt.

9.11.—*bouleaux*, noun, masc., plur.; birch-trees.

9.11.—*se trouvait*; lit. 'found itself.' Translate 'was.'

9.11.—*près de*; near.

9.12.—*favorite*, adj., fem., sing.; favourite. The feminine is irregularly formed, the masculine being *favori*.

9.12.—*où;* to which.

9.12.—*se retirait*, lit. 'retired herself.' Translate 'retired.'

9.13.—*pour faire ses prières;* to say her prayers. For *pour* see note on 5.3 in the September part. The verb *faire* is largely used in French to replace other verbs than 'make' or 'do' in English. For example, *faire attention*, pay attention; *faire une malle*, pack a trunk.

9.14.—*à s'y rendre*, lit. 'to betake herself there,' *i.e.*, 'to go there.' Notice the difference in use between *y* and *là* in the sense of 'there.'

y is *relative*, that is, it is used when the place it refers to has just been mentioned, as, *Je vais à Paris et je compte y rester deux jours.* 'I am going to Paris, and I intend to stop there two days.'

'*Là* is *demonstrative*, *i.e.*, it points out a place, which has not been previously mentioned, as *Il est tombé là;* 'he fell there.'

9.16.—*venait prier Dieu;* came and prayed to God. *Aller* and *venir*, followed *immediately* by infinitives, are equivalent to our expressions, 'Go *and*, etc.,' 'Come *and*, etc.' For example, *Je viendrai vous voir*, 'I will come and see you.' '*Je vendrai pour vous voir*,' 'I will come *to* see you.'

9.19.—*de l'exécuter*, to carry it out. For the *l'* see note on 7.10.

9.21.—*au point de négliger*, lit. 'to the point of neglecting,' *i.e.* 'so far as to neglect.'

9.22.—*ce qui lui attirait des reproches de ses parents*, lit. 'that which attracted to her reproaches from her parents.' The *ce* is not translated into English. Translate, 'which brought on her reproaches from her parents.'

9.24.—*longtemps*, a long time. Our English 'a' with this expression is not translated into French.

9.24.—*avant d'oser*. See note on 7.27. *Oser* is one of those verbs like *aller* and *venir*, which do not require *à* or *de* when the infinitive of another verb follows.

9.25.—*s'ouvrir à eux*, lit. 'to open herself to them,' *i.e.* 'to unbosom herself to them.' *Eux* translates 'them' when a preposition precedes the word in French.

9.27.—*Chaque*, adj., masc. and fem.; each. The *pronoun* 'each' is *chacun*, *chacune*, as *Chacun à son goût*. 'Each to his taste.'

9.27.—*approchent de*, approached. *Approcher* is followed by *de* in French. Compare *jouer de* 'to play' (a musical instrument) *jouir de* 'to enjoy' (something).

9.28.—*explication*, noun, fem., sing.; explanation.

9.28.—*dont*, of which.

9.29.—*prévoyait*, impf., ind., 3rd sing. of *prévoir*; foresee.

9.30.—*le peu de succès*, the little success. Adverbs of quantity, like *peu*, *beaucoup*, *moins* are followed by *de*.

9.31.—*Lorsqu'elle crut avoir suffisamment mûri son projet*, lit. 'when she believed to have sufficiently matured her project.' Translate 'when she believed she had sufficiently matured her project.'

9.31.—*Crut*, pret., 3rd, sing. of *croire*; believe.

9.32.—*détermina*, pret. 3rd, sing. of *déterminer*; fix.

9.33.—*où*, on which.

9.33.—*se proposa fermement*, lit. 'proposed to herself firmly,' *i.e.*, 'firmly resolved.'

9.34.—*vaincre*, vb., inf.; conquer.

9.35.—*se rendit*, betook herself.

9.36.—*de bonne heure*, early.

à la bonne heure, all right.

9.36.—*pour demander à Dieu*. See notes on 5.3 and 9.1.

9.37.—*s'exprimer*, express herself.

10.1.—*revint*, pret., 3rd, sing. of *revenir*; return.

10.1.—*ensuite*, afterwards.

10.2.—*résolue*, past. part., fem., sing. of *résoudre*; resolve.

10.3.—*rencontrerait*, condit., 3rd, sing. of *rencontrer*, meet.

10.3.—*lui fît trouver sa mère*, 'Should make her find her mother,' *i.e.*, 'should cause her to find her mother.'

fît, impf., subj., 3rd, sing. of *faire*; make.

This form of the subjunctive is distinguished from the pret. ind. 3rd, sing., by the circumflex over the vowel.

10.5.—*plus de condescendance*, more compliance. See note on 9.30.

10.6.—*en approchant de la maison*, in approaching the house. See notes on 8.10 and 9.27.

10.7.—*assis*, past part. of *asseoir*; to seat.

10.7.—*banc*, noun, masc., sing.; bench.

10.7.— *près de*, near. See note on 6.17.

10.8.—*vint*, pret., 3rd, sing. of *venir*; come.

10.9.—*Commença*, commenced. For the explanation of the cedilla, see note on 7.25.

10.11.—*chaleur*, noun, fem., sing.; heat, earnestness.

10.14.—*écoutée*, past part., fem., sing. of *écouter*; to listen to. It is fem., sing. because the direct object *l'* (*la*, her) precedes it.

10.14.—*sans l' interrompre*, without interrupting her. The gerund after a preposition is expressed by the infinitive form in French.

10.15.—*du plus grand sérieux*, lit. 'of th greatest serious,' *i.e.* 'with his most serious look.'

10.15.—*prit*, pret., 3rd, sing. of *prendre*; take.

10.16.—*main*, noun, fem., sing.; hand.

10.16.—*dans*, into. See note on 8.34.

10.17.—*apprêtait*, imperfect, 3rd, sing. of *apprêter*; prepare.

10.19.—*puissant*, adj., masc., sing., powerful.

10.20.—*Voilà notre fille*, lit. 'see there our daughter.' Translate 'there is our daughter.'

10.20.—*va*, pres., indic., 3rd, sing. of *aller*; go.

10.21.—*sur l'heure*, lit. 'on the hour,' *i.e.*, 'at once.'

10.22.—*veut*, pres., indic., 3rd, sing. of *vouloir*; wish. *Vouloir* = wish. *Je le veux*, I wish it. *Vouloir bien* = to be willing. *Je veux bien le faire*, I am willing to do it.

10.22.—*se charger de*, to undertake.

10.24.—*plaisamment*, jokingly. Adjectives in *nt*, like *plaisant*, *suffisant* change this into *mment* to form the corresponding adverb of manner.

10.24.—*tout ce que lui avait dit Prascovie*. When *ce que* commences a sentence the subject, if a noun, may be placed after the predicate.

10.25.—*ferait*, condit, 3rd, sing. of *faire*; make.

10.26.—*mieux*, adv., better, *meilleur*, adj. better.

10.26.—*répondit*, pred., indic., 3rd, sing. of *répondre*; answer.

10.27.—*venir vous conter ces balivernes*, Come and tell you this nonsense.

10.28.—*s'était armée*, had armed herself. For the fem. part. See Rule E (2).

10.29.—*d'avance*, beforehand.

10.29.—*colère*, noun fem. sing.; anger. Compare English *choleric*.

10.30.—*n'eut point de force*, had not any strength. *De* after a negative verb = any.

10.31.—*persiflage*, noun, masc., sing.; raillery.

10.31.—*anéantir*, verb, inf.; annihilate.

10.32.—*se mit à pleurer*, lit. 'put herself to weep,' *i.e.*, 'Commenced to weep.' *mit*, pret., 3rd of *mettre*; put.

10.33.—*amèrement*, bitterly.

10.33—*qu'un instant de gaieté avait fait sortir de son caractère*, lit. 'whom a moment of gaiety had made go out of his character,' *i.e.*, 'had caused to forget his character.'

10.35.—*reprit*, pret., 3rd, sing., of *reprendre*; take again.

10.35.—*Tandis que*, conj., whilst.

Tandis que, whilst, expresses *contrast* and *not time*.

Pendant que, *durant que*, whilst, expresses *time only*.

11.1.—*attendrie*, past part, fem., sing. of *attendrir*; move, soften.

11.2.—*riant*, pres. part, of *rire*; laugh.

11.2.—*allons*, = come. It is really the imperative 1st plur. of *aller*, 'let us go."

11.3.—*linge*, noun, masc., sing.; duster.

11.3.—*commence*, imper., 2nd, sing. of *commencer*; commence.

11.3.—*par nettoyer*, by cleaning. See note on 10.14.

11.4.—*pourras*, fut., 2nd, sing. of *pouvoir*; be able.

11.5.—*à ta commodité*, lit. 'at thy convenience.' Translate 'at your convenience.' The second singular pronoun is used in French by near relatives when addressing one another.

11.7.—*Cette scène était plus faite*, lit. 'This scene was more made,' *i.e.*, 'more calculated.'

faite, past part. fem. sing. of *faire*; make.

11.9.—*de mauvais traitements*, lit. 'some bad treatment.' Do not translate 'some' into English.

The partitive article is translated by *de* alone when an adj. precedes the noun.

11.11.—*de se voir traiter*, to see herself treated.

11.11.—*se dissipa*, lit. 'dissipated itself,' *i.e.*, 'disappeared.'

11.13.—*glace*, noun fem. sing.; ice.

11.13.—*rompue*, past part. fem. sing. of *rompre*; break. Rule C.

11.13.—*elle revint à la charge*, lit. 'she returned to the charge,' *i.e.*, she made new 'attempts.'

revint, pret. 3rd sing of *revenir*; return.

11.14.—*à plusieurs reprises*, on several occasions.

11.15.—*prières*, noun, fem., pl.; prayers.

11.15.—*furent*, pret. 3rd, pl. of *être*, to be.

11.16.—*importunes*, adj., fem., pl. (agreeing with *prières*), troublesome.

11.16.—*perdant*, pres. part. of *perdre*; lose.

11.17.—*gronda*, pret., 3rd, sing. of *gronder*; scold.

11.17.—*lui défendit*, lit. 'forbad to her.' Translate 'forbad her.'

11.18.—*là-dessus*, lit. 'there-upon.' Translate 'on that subject.'

11.19.—*davantage*, more. At the end of a sentence it is better to use *davantage* than *plus*.

11.20.—*douceur*, noun fem. sing. gentleness.

11.20.—*tâcha de lui faire comprendre*, endeavoured to make her understand.

Tâcher, to endeavour; *tâche*, a task; *tacher*, to stain; *tache*, a spot.

11.21.—*songer à*, dream of.

penser à, think of.

11.22.—*depuis lors trois ans*, lit. 'since then three years.' Translate 'since that time three years.'

11.22.—*s'écoulèrent*, pret. 3rd, pl. of *s'écouler*; slip away, pass away.

11.22.—*sans que Prascovie osât*, lit. 'without that Prascovie dared.' Translate 'without Prascovie daring.'

osât, impf. subj., 3rd, sing. of *oser;* dare. Subj. follows *sans que*. Rule F (5).

11.24.—*instances*, noun, fem., pl. ; entreaties.

11.26.—*Contraignit*, pret. ind., 3rd, sing. of *contraindre ;* force.

11.26.—*renvoyer*, gerundial infinitive, to put off.

11.27.—*à des temps*, lit. 'to some times.' The 'some' is not translated into English.

11.28.— *il ne se passa pas un seul jour*, lit. 'it did not pass itself a single day.' Translate 'there did not pass a single day.'

11.29.—*sans qu'elle joignît*, without her adding.
joignît, impf. subj., 3rd, sing. of *joindre ;* join, add.

11.30.—*celle*, pro., fem., sing., that (refers to *prière*, prayer).
celle d'obtenir, that of obtaining.

11.32.—*exaucerait*, condit., 3rd, sing. of *exaucer ;* hear (a prayer).

PUBLICATIONS REVIEWED.

Mental Science and Logic for Teachers. By Thomas Cartwright, B.A., B.Sc. London: Joseph Hughes and Co.

The object of this book is to supply Candidates for Teachers' Certificates and for other examinations with the means of preparing themselves to satisfy the examiners in Mental Science or Psychology and Logic. The subjects are dealt with in a simple and systematic manner, and from the teacher's standpoint. The treatment is, indeed, eminently practical, as may readily be seen on reference to the chapters on 'The Training of the Senses' and on 'Memory and its Training.' In the former we have a good account of the Kindergarten Method and Froebel's *Gifts ;* in the latter a clear statement of the nature and laws of memory and the practical conclusions to which these should lead the educator. Some of the rules laid down are remarkably concise and telling in form. For example, in regard to the order of forming new impressions, and adding to the knowledge of pupils :—'The order must ever be THINGS, IDEAS, WORDS. The best "things" are the REAL OBJECTS themselves. Failing these, *models* should be resorted to, then *pictures* or *diagrams*, *word-pictures* being a last and very poor resource.' Again, 'The child's *natural curiosity*, his innate *yearning for sympathy*, and his *proneness to activity*, both bodily and mental, are "as arrows in the hands of the mighty."'

The chapters on Formal Logic are of necessity somewhat technical, but interest is secured by the use of many illustrative examples and the frequent employment of graphic delineations. The difference between Deduction and Induction is well explained. An appendix of twenty pages contains some thirty admirable answers to questions set at the Certificate Examinations during the last few years. A further appendix of forty pages consists of two very complete chapters on the Central Nervous System and the Physiology of the Senses from a work by Prof. Overend. This physiological section is added to help students in understanding the chapters on Sensation and the Training of the Senses.

It ought to be noted that the work is based on the writings of Bain, Sully, Spencer, and many other leading authorities on psychology and pedagogy, and the student who may have a liking for such subjects will find it admirable as an introduction to larger works, or as a compendium to assist the memory after going through a more extensive course of reading. For those students who may not need or wish for an extended course, this manual may be confidently recommended as a sound and sufficient text-book.

We have noted one or two trifling faults: In the fourth column of the Tabular View of the Senses facing page 36, 'Light proper' is obviously a misprint for 'Sight proper.' In the same table, column 5, occurs the awkward expression, 'Tastes difficultly discriminated.' On page 97, the first of the eight rules of Syllogism is made, unintentionally, it may be presumed, to include the second—the words 'and three prepositions' should be omitted.

The book is printed in good type, with the more important words and sentences in bold clarendon, and the binding is neat, tasteful, and substantial.

Elementary Physiography. By Richard A. Gregory, F.R.A.S. London: Joseph Hughes and Co.

We have spent considerable time in a careful reading and thorough examination of this text-book, and the task has been productive alike of pleasure and of profit. The amount of information contained in the work is enormous, and yet it is presented in so readable a form that even the general reader who has any interest in scientific subjects will find much of the matter very attractive. The primary purpose of the author, however, is to provide a text-book for the efficient assistance of such students as may wish to prepare for the examinations of the Science Department in Elementary Physiography ; and it is necessary to consider how this purpose is fulfilled. The subject is a wide one. It has been defined in one text-book as 'a description of nature.' This may be correct as a mere etymological definition ; but physiography is not merely a description of nature. It is rather a scientific statement of the general facts about natural phenomena, and an adequate account of the principles which underlie the phenomena, and explain their occurrence. This is the view which Mr. Gregory has taken of the subject. In a remarkably well-written introductory chapter, for the nucleus of which he expresses his indebtedness to Mr. Fournier d'Albe, our author develops this view of his task ; and in the twenty-one chapters which follow he deals most ably with every department of the comprehensive science—from the elementary notions of matter and motion to the facts and theories of seismography, meteorology, magnetism, and electricity. The chapters on the Physical and Chemical Properties of Matter are very satisfactory; and those on Measuring Angular Space and Time, on the Movements of the Earth, and on its Astronomical relations, are extremely full and clear. Some interesting chapters on Rocks: their Formation and Classification, lead on to an excellent account of Volcanoes and Earthquakes. This lays before the student the explanations accepted by the most recent and accomplished authorities on the subject, the works of Professor Judd and Professor Loomis being frequently quoted or referred to. One striking characteristic of this volume is, indeed, if the expression may be pardoned, its up-to-dateness. In the preface the author alleges as his excuse for adding to the books on physiography the need for this particular quality, on account of the recent remarkable developments of physical science. No one can deny the force of this as an excuse ; but for the production of such an admirable work as the one before us it would seem that its own merits constitute the most valid reason.

As instances of this feature of being abreast with the time may be mentioned the copy of a Newspaper Weather Chart of December, 1891, with the full explanation and remarks, and copies of two weather reports with charts and explanation as issued from the Meterological Office in November of 1891, and illustrating the Cyclone of November 11th.

Other features deserving notice and commendation are the numerous practical suggestions for experimental demonstrations of the subjects under discuss.on, and the many and excellent diagrams and illustrations. . The highly-finished instruments for meteorological and other scientific observations are figured, described, and explained. The works of Darwin, Tyndall, Judd, Mallet, Sir George Nares, Loomis, and other scientific writers are frequently appealed to ; and, in short, no means of interesting and informing the student are unemployed.

As a specimen of the clear and concise nature of the style employed may be quoted the defining passage on the action of external forces on the earth's crust. 'By the chemical and mechanical action of the external forces, rocks are broken or crumbled into powder or *débris*, the process being known as *disintegration*. *Transport* is the word used to express the carrying away of disintegrated materials. *Disintegration* and transport constitute *erosion*. The result of erosion is termed *denudation*. *Sub-aerial* denudation is produced by atmospheric action, and therefore *pluvial* denudation, or that brought about by rain, comes under this head. It also includes *fluviatile* denudation by rivers. *Marine*

denudation is produced by the action of the sea, and *glacial* denudation by that of ice.'

At the end of each chapter is given a selection of questions, most of which have been chosen from the Science Department's examinations of the last few years; and at the end of the book the papers of the last two years are printed with answers that may justly be called model answers.

A small number of errors appear in the 400 pages contained in the volume. On page 10, 'Matter is indivisible,' should be divisible. On page 18 it is stated of a body let fall in a moving railway carriage, that it 'will fall to the floor of the carriage, the circumstance of the train being in motion not affecting it at all.' Surely, it should be said that the motion of the train has its full effect in determining the line of fall, as the body falling within the carriage is carried along with the moving carriage. On page 317, 'The greatest known mean annual rainfall in Europe occurs at Seathwaite, Cumberland, the average of fifteen years' observation being 139 inches.' On page 313 the mean annual rainfall for Ben Nevis, Scotland, is given as 141·76 inches. In the sentence quoted above probably England is meant rather than Europe. On page 346, Harrogate is printed twice with a redundant *w* intruding. These, and two or three stray printer's errors, will no doubt be corrected in a second edition, for which the demand is pretty certain to arise soon. A book of such sterling value, so full, so thorough, and so cheap (its price is only half-a-crown), cannot fail to be received with general satisfaction.

Methods of Teaching. By John Wilson, M.A. London, Edinburgh, and New York: T. Nelson and Sons.

This manual of 440 pages is not unduly ambitious (as compared with its performance) in its aims, although it claims to be a '*Practical Guide to the Schoolroom*.' Throughout it is characterised by sound common sense and a judicious compromise between the ideally and actually possible. No mere thinker, however profound, could have produced this work. Yet although the author appeals most to the ordinary wisdom of experience, it is evident that his knowledge of his subject is abundantly supplemented by intimate acquaintance with standard educational manuals.

We can find nothing very material to condemn, and very much cordially to commend. In almost every case the detailed steps given are complete in their graduation and sound in their methods. Pupil Teachers, inexperienced or unsuccessful teachers will save themselves much time, labour and friction by noting what the Author calls '*The sticking-points*' of the various subjects taught. Mr. Wilson very seldom indeed fails 'to spot' these accurately.

The language of the book is clear, at times forcible, and at times almost homely. It does *not* bristle with technical terms, and is not prolix.

One sentence, however, puzzles us—'*It is most injudicious to begin children to multiply*,' etc., page 117.

In Grammar we are glad to see that impostor, 'The Potential Mood,' scoffed at; but we think the treatment of the Possessive Case as being simply the case of the possessor should not have stayed at that point.

The fault of the book is the comparative paucity of diagrams, not one being given in the chapter on Map-Drawing; and in connection with this defect it is singular to note that in treating of Reading, Reading Books, and the teacher's chat with his class over a Reading Lesson, pictures and illustrations are nowhere mentioned. We speak of these blemishes with a little hesitation, and with no disposition to magnify them, lest too low an opinion may be formed of a skilfully-planned, a conscientiously-executed, and a most useful handbook.

University Corr. Coll. Tutorial Series: Milton's Samson Agonistes. Edited by A. J. Wyatt, M.A. Lond. London: W. B. Clive and Co.

The text of this edition is carefully printed. The introduction gives briefly and succinctly an account of the characteristics of the Greek drama, and a detailed comparison of Milton's work with his models. The structural analysis will materially help the student. We cannot approve of the plan of printing before the play itself a collection of critical comments. Certainly the editor has included in his extracts expressions of extremely divergent views, and these may, as he intends, stimulate the mind of the student, and render it impossible for him 'to adopt a set of ready-made opinions.' This end, however, would be quite as well attained if the critical comments were placed at the end of the book, so as to encourage the student to read the play first and form some opinions of his own as to its literary character before reading a lot of contradictory and confusing criticisms written by other people.

The notes, without being too voluminous, contain everything that should be needed. Obsolete and archaic words, Latinisms, and other peculiar constructions, and the numerous classical allusions are sufficiently explained. Many illustrative quotations from Johnson, Todd, Professors Percival and Masson, Dr. Garnett, Mark Pattison, and other writers are included in the notes. There seems to be a slip in the note on line 1,126, where 'that' is said to stand for 'so that.' Its correlative is 'such' in line 1,124. The volume is one we have read with pleasure, and can cordially recommend to students.

This World of Ours: An Introduction to the Study of Geography. By H. O. Arnold-Forster. London: Cassell and Co.

This is an excellent book, and one that should be read by all who wish to have clear and correct notions of the aims and methods of geographical education. Mr. Arnold-Forster knows what to say and how to say it to interest the ordinary reader as well as the student. The plan, the method, execution and illustrations cannot be too highly praised. In twenty-two chapters the facts of geography—using the word in its widest sense—are described. The world is considered as a planet moving in space. The materials of which it is made, and the ways in which those materials have come to be arranged in their present form, are pleasantly stated. Physical Geography, Commercial Geography, Military Geography, Statistical Geography, and all the other branches into which the science has been divided are dwelt upon, and the connection between these divisions clearly indicated. The information covers so wide a range that one is surprised at not detecting a disjointed arrangement—a jumble of facts without any evidence of their inter-relation. Mr. Arnold-Forster has avoided this common defect, and has produced a 'harmonious whole,' which impresses upon his readers that 'the study of geography is one of the most fascinating that can possibly be undertaken, is one which can be followed with pleasure and profit at all times and in all places, which makes travelling a perpetual enjoyment, and staying at home a perpetual opportunity.'

Arithmetic for Schools. By Charles Smith, M.A. Cambridge: At the University Press.

This is a new volume of the excellent Mathematical works known as the Pitt Press Series. It is marked by thorough and rational treatment of the subject, but especially by the wonderfully simple and clear logical statement of principles, and explanation of methods based thereon. The style in which the matter is presented makes even the elementary parts positively interesting reading to anyone who cares for lucidity and good reasoning. Methods of obtaining approximate results for practical purposes are explained, and commercial arithmetic is thoroughly dealt with. Miscellaneous problems are arranged and exemplified under types, as *Mixtures, Work and Time, Races and Games*. The exercises are extremely varied and numerous. The miscellaneous examples at the end of the book number five hundred, besides fourteen recent papers set at the Oxford and Cambridge local and school examinations and by the College of Preceptors.

The book is one which on every ground we can highly recommend.

A New Departure in Astronomy. By E. H. London: Chapman and Hall.

If we assume a planet or any other heavenly body to be once set in motion, nothing further than gravitation is required to explain perfectly all its motions forever after. Before Newton all sorts of causes were imagined to produce the movements of the heavenly bodies; one of the ideas was that angels were deputed to push the stars through space, each taking care to see what his companion-spirits were doing, so that collisions or changes of relative position should be avoided. Newton showed that everything could be explained by assuming the existence of force. This does not go back far enough for E. H., the author of the pamphlet before us. He wishes to trace force to its origin—to determine what constitutes force. 'If the earth had been launched into space, that could only have been accomplished by the direct action of force, and we ought to be able to trace the origin of that force, for every speck of star-dust in the firmament must have been launched into space by the same force.' To find out force is a task very similar to discovering a fourth dimension. The anonymous author thinks he has proved his case, but the arguments he uses are generally illogical, and it is often difficult to see the point he is trying to make. However, he is evidently happy in his convictions, although, so far, astronomers have not been convinced of their importance.

Typical Government Problems. Standards III. and IV. London: Blackie and Son.

These are two 'collections of arithmetical problems set by Her Majesty's Inspectors, arranged and graduated for school use.' The plan adopted is to place under a special heading a few easy questions of a certain type for mental working, and then follow them by more advanced questions worked on the same principle. Thus, in the course of some forty pages for each standard, nearly all the possible varieties of problems are exhausted. We are convinced that such a method of teaching Arithmetic by classified practical questions is thoroughly rational; and any child who has intelligently worked through one of these books will have no need to fear the problems set for the corresponding standard at the Government examinations.

Vere Foster's New Copy Books. Bold Writing or Civil Service Series. No. 3A. London: Blackie and Son, Limited.

Another number of the series we recently noticed. Slope moderate, strokes heavy, size known as round-hand or half-text, contents capital letters, figures, short words and sentences—such is a brief and sufficient description of the book.

Barnard Smith's Chart of the Metric System. Revised by George Collar, B.A., B.Sc. London: Macmillan and Co.

This wall sheet gives a sketch of the main principles of the metric system, describes the mode of formation of the names employed, gives tables of length, surface, volume, weight, and money, and illustrates pictorially the relative dimensions of the units employed. With it is published a loose sheet with explanatory drawings, enabling those who are clever with scissors and paste to make a model decimetre cube and a vessel to hold exactly one litre. Every now and then some consular report conveys the impression that British trade, in some particular market, is suffering from the peculiarities of British weights and measures, the intricacies of which are said to repel foreign purchasers. These complaints stimulate to further action that portion of the British public interested in the adoption of the metric system, but whether their exertions will ever result in the overthrow of the old system is a question difficult to answer. At any rate a wall sheet, descriptive of a system which is used in France, Germany, Belgium, Italy, Portugal, Spain, Sweden, Norway, and some other countries, is one which might, with advantage, find a place upon the walls of all our schools.

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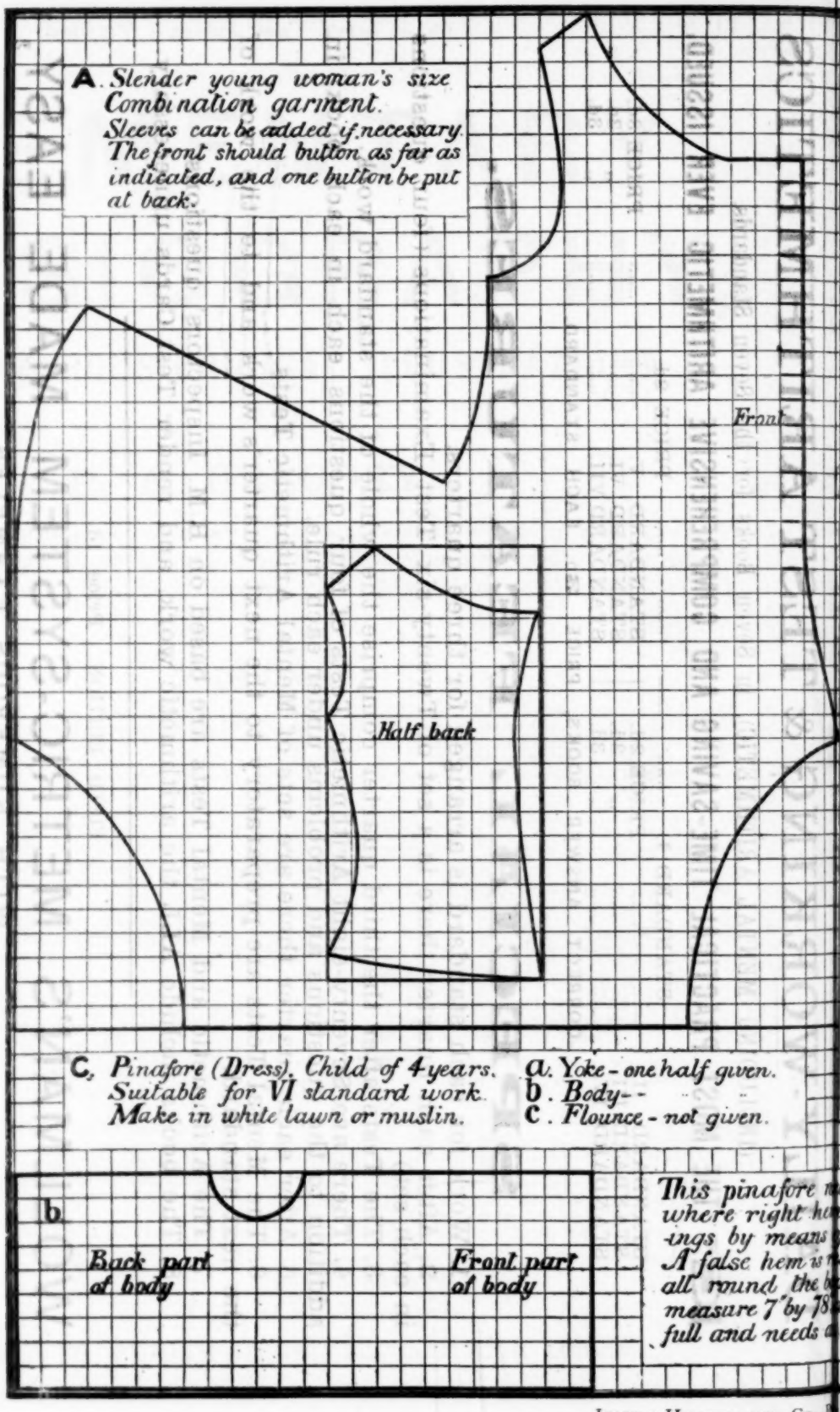
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Half back
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where right
ings by means
A false hem is
all round the
measure 7" by 18
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Half back

afore needs no opening beyond that of the body
ght hem should overlap left, and where two fasten
means of buttons are needed.
hem is required to secure gathers of flounce at back
d the body. Frill not given in diagram, but it should
7" by 18" and be gathered into body, which is in itself
needs a slip tape to draw in to child's figure.

a.

Yoke of Pinafore.

Front